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CREATIVE THINKING, which provides basic ideas; and *capital,* which purchases the tools, machinery and materials needed to transform those basic ideas into actual jobs.

These jobs, useful jobs, render a service to other men at a reasonable price and, in turn, create new ideas and new capital which create useful jobs for more men, etc., etc.

The seeds come from the American economic system of free enterprise which provides an incentive for men of creative talent to create basic ideas, and which gives all men a chance to invest their savings in tools and machinery to carry out the basic ideas.*

HALLIBURTON OIL WELL CEMENTING CO.
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the OIL AND GAS JOURNAL

published weekly by the

PETROLEUM PUBLISHING COMPANY

211 S. CHEYENNE ST., TULSA, OKLAHOMA

Subscription price, United States and foreign, 1 year, $6.00; 2 years, $10.00; 3 years, $12.00; 5 years, $15.00. Single copies, 20 cents. Back copies, when over a year old, 50 cents. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879. Copyright 1944, by The Petroleum Publishing Co.

Vol. 42, No. 35 January 6, 1944

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CUDAHY [MILWAUKEE SUBURB] WISCONSIN

the OIL AND GAS JOURNAL

Trends

Crude-Oil Production By States — Page 78

CRUDE-OIL STOCKS 241,310,000 bbl. as of Dec. 25—down 485,000 bbl. One year ago 233,227,000 bbl.

GASOLINE STOCKS 74,024,000 bbl. as of Dec. 25—up 1,299,000 bbl. One year ago 77,781,000 bbl.

RESIDUAL FUEL-OIL STOCKS 57,596,000 bbl. as of Dec. 25—down 676,000. One year ago 72,943,000.

GAS OIL AND DISTILLATE 43,791,000 as of Dec. 25 down 326,000 bbl. One year ago 45,414,000.

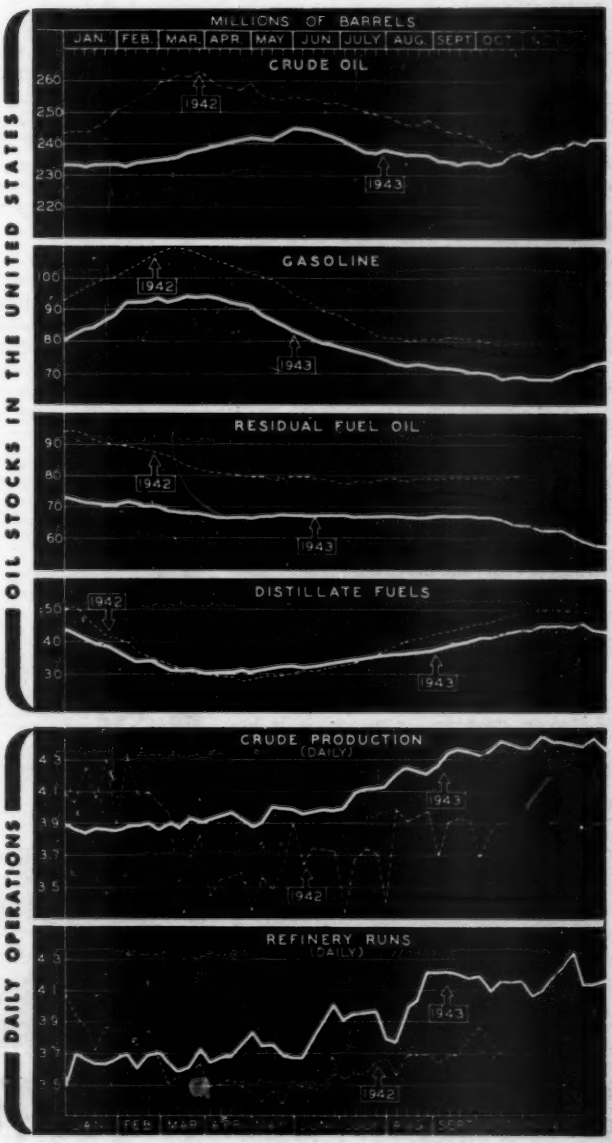
CRUDE-OIL PRODUCTION 4,358,140 bbl. daily average—down 6,500 bbl. One year ago 3,869,855.

REFINERY RUNS 4,185,000 bbl. daily week ended Dec. 25—up 39,000 bbl. One year ago 3,508,000.

THERE are an increasing number of operators whose business is largely or exclusively confined to the production of natural gas who are wondering if the government agencies and the closely allied petroleum industry, fully appreciate the problems that confront them at the start of a new year. They have just closed a record-breaking year in both production and consumption, and they are being asked to expand their operations further throughout 1944.

THE Bureau of Mines estimates that in 1943 the marketed production of natural gas totaled 3,369 million cu. ft., an increase of 10 per cent over 1942. The American Gas Association has compiled data showing that all of the principal outlets for natural gas—domestic, commercial, industrial, and electric generation—expanded in 1943 to new yearly records, with a 12.2 per cent over-all gain in demands. The largest increases in demand have been in electric generation, 26.6 per cent, and industrial uses, 12.5 per cent. These increases reflect war needs. In fact, the association estimates that approximately 70 per cent of the total natural-gas demand, exclusive of field uses, comes from war plants or utilities serving war plants.

THE most acute problems appear to center in the eastern and some of the middle-western states where the production of natural gas is more important than crude-oil producing operations. Operators feel that they are entitled to generally higher prices for their gas at the wells in those areas. Much of the production comes from the Appalachian areas, where drilling and producing operations entail many hardships, especially during the winter months. Because of these conditions many employes have left the natural-gas fields to get more desirable and higher-paid employment among war plants in the same area. There also has been concern regarding the competition which will come from a new line now being laid from Texas to West Virginia and the additional competition should one of the big-inch lines of the petroleum industry be converted to natural gas. Drilling operations in the Appalachian area have been greatly expanded over the past year because of the shortages with which all classifications of users were confronted. No important new fields have been discovered and producers are pointing out that their operations now are all of the "stripper" class and should receive special consideration in the matter of returns at this time.



CUDAHY [MILWAUKEE SUBURB] WISCONSIN

Possibility of Converting One WEP Line to Gas Service Considered by Industry

by Paul Reed

NOW that conversion of one of the lines of War Emergency Pipelines, Inc., to natural-gas service is under consideration, the future possibilities of these two systems are being studied from various angles.

Why is serious attention given to such conversion at the beginning of 1944 in a period of accelerated military service? How might the country benefit by planning for conversion now? What are the relative advantages of converting either the 24-in. crude-oil line, now reaching full capacity operation, or the 20-in. products line which is nearing completion?

With the submarine menace under such definite control that the increasing tanker fleet can move more freely, WEP faces a different outlook from that of a year ago. Although the cost of transporting through the WEP lines has been estimated to be low enough to put one and possibly both of them on a competitive basis with tankers, there are certain inherent advantages in tankers because of their flexibility which make them attractive for oil-industry transportation needs. For this reason, it is expected that such a large number will be put in service of shipping from Gulf Coast ports that in the last half of 1944 there will be need for only one of the two WEP lines. However, between now and summer, it is believed that there will be need for operating both the 24-in. crude-oil line and the 20-in. products line to full capacity.

Examination of the present rate situation under which the WEP lines operate indicates that if this continues and both lines function at high capacity, the money invested in them will be nearly if not entirely paid out by the latter part of the summer. By that time they will have rendered the service for which they were planned as a wartime measure which resulted in a profitable undertaking with exceptionally low operating costs and a lower investment than originally anticipated.

Maston Nixon, president of Texas Mid-Continent Oil and Gas Association, speaking as an individual, has called attention to a saving of 200,000 tons of steel which might be effected if an arrangement could be made to dispose of one of the WEP lines to Tennessee Gas & Transmission Co., which would mean that the company could eliminate a large part of its construction program which has been scheduled for completion at the end of 1944. Nixon asserts that the steel saved would serve the industry more effectively as oil-well casing.

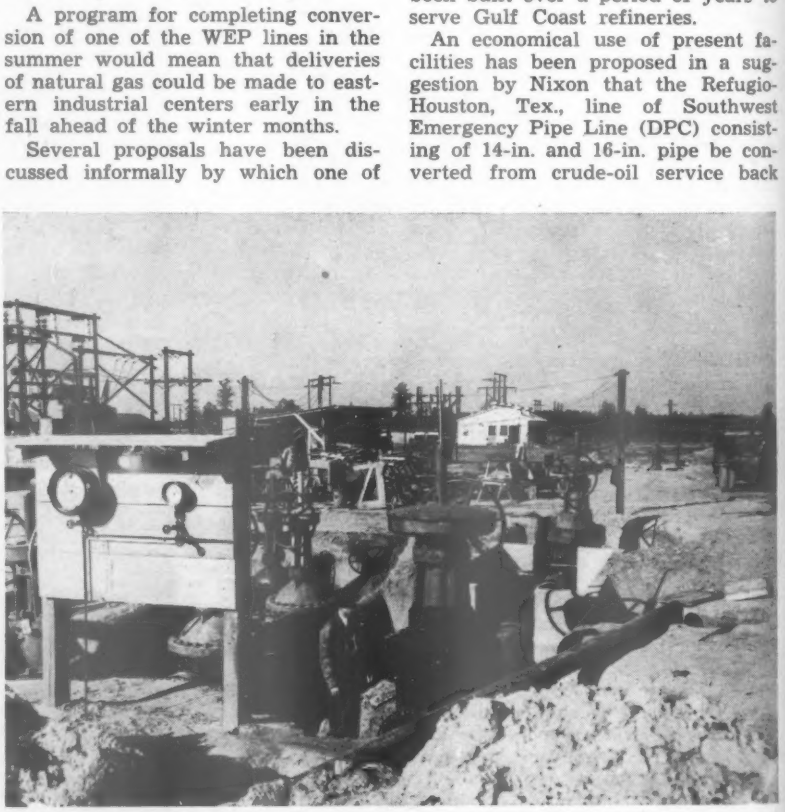
A program for completing conversion of one of the WEP lines in the summer would mean that deliveries of natural gas could be made to eastern industrial centers early in the fall ahead of the winter months.

Several proposals have been discussed informally by which one of the WEP lines could be taken over without undue risk. And it is believed that some arrangement could be made by which such a line could be leased for a 10-year period with an option to buy. Since the Government's investment will be largely, if not entirely, amortized by the time proposed conversion could be effected it would be in a position to make favorable terms.

Either Big-Inch Suitable

While it was originally proposed that the 20-in. line should be selected for conversion to natural-gas service, the proponents have recently acknowledged that either the 24-in. or the 20-in. line might be effectively utilized for this purpose. Comparison of relative advantages has indicated that the possible saving of steel by utilizing the 20-in. line for gas would be offset by the advantage which the oil industry would gain by retaining the 20-in. system as a petroleum pipe line. As a result of its present location with Gulf Coast connections the 20-in. line is adaptable for assignment to either products or crude-oil service. A large part of the crude oil now destined for the WEP 24-in. line must come via Gulf Coast terminals to Longview, Tex., because the pipeline network of the Southwest has been built over a period of years to serve Gulf Coast refineries.

An economical use of present facilities has been proposed in a suggestion by Nixon that the Refugio-Houston, Tex., line of Southwest Emergency Pipe Line (DPC) consisting of 14-in. and 16-in. pipe be converted from crude-oil service back



Temporary instrument board installed to serve during testing of WEP 20-in. products line while pump station construction is being completed. In the distance is a pump station of the WEP 24-in. crude-oil line

to its original status as a gas line and that 52 miles of high-pressure line be built from Agua Dulce to connect with the Southwest system at Refugio. Construction of an additional line from Houston to Longview would be required if the 24-in. line is to be converted to transmission of gas. Although the diameters of lines involved in this proposal are smaller than the 24-in. planned by the Tennessee company, they are said to be capable of transmitting the 100,000,000 cu. ft. daily throughput contemplated for the first stage of Tennessee operations.

For a while the eastern end of the WEP 24-in. between West Virginia and the East Coast would be empty if the western section were converted to gas. But owing to the imminent shortage of crude in the Great Lakes refining area, it could be useful for shipping imported crude inland after the war. In fact some objection has been raised to conversion of either of the WEP lines to gas service because of the desirability of having one of them available for importing crude into District 2 later on, possibly from both the Atlantic and the Gulf coasts.

The views outlined in this article have been widely discussed by major company executives in the last few weeks. However, no negotiations with Tennessee Gas & Transmission Co. have been reported as yet.

The proposals which have been put forward would mean that with conversion of one WEP line to gas the other would be retained as a facility to meet oil-transportation demands of the industry.

Lighter Cars, New Power Units in Postwar Era, Scientist Predicts

NEW YORK. — A great American air-transportation fleet, lightweight cars with twice the present gasoline mileage and radically new types of power plants were some of the predictions for the United States of 1953 made to members of a New York social club last week by Dr. Carlton H. Schlesman, research and development head of Socony-Vacuum Oil Co., Inc.'s general laboratories. Schlesman's address centered on the oil business and covered some of the industries in which oil and oil products are closely associated. He admitted that such predictions are risky but that "it is important to try to learn what direction our industry will take in the next decade."

He predicted that the United States would have the greatest air-borne transportation fleet in the world by 1953, with 4,000 planes available, of which 3,600 would be in daily operation. Direct employment for this fleet would entail 12,000 men for flying crews, 18,000 for relief flying crews and 36,000 ground and service personnel. "Such a fleet would carry 90,000 passengers daily for a total of 50,000,000 passenger miles. In addition, 5,000,000 ton miles of freight would be flown every day. An operation of this kind would require 3,000,000 gal. of aviation gasoline and about 100,000 gal. of lubricating oil daily," he said. Schlesman doubted if private flying would reach the proportions some have predicted.

The passenger automobile of 1953 will be smaller than today's car, much lighter in weight and powered with a small-cylinder, high-compression motor that will have one-half the gasoline consumption of the cars of today, according to the research engineer from Socony-Vacuum's laboratory at Paulsboro, N. J. "The 1953 car will be small, but it will be as commodious as today's automobile; streamlining and more practical design will assure that. Alloy steels, aluminum and plastics will be used to keep the car light; yet it will have great rigidity, with virtual elimination of the frame," he said.

"Engines will be designed to permit sustained cruising speeds of 60 m.p.h. They will be required to develop only 35 hp. at that speed and will utilize their full power potential. The high-powered engine of today that uses only 12 per cent of its power output at conventional war speeds will disappear. The 1953 power plant will deliver 40 miles to a gallon of gasoline at 30 miles an hour and will reach maximum economy of operation at that speed. These engines will be small in size, relatively light in weight and will be of the high-compression type to utilize most satisfactorily the higher-octane gasolines which will be available," Schlesman said. He added that, as he sees the future, there will be no need to raise the power rating of motor gasoline beyond 90 octane number.

Schlesman warned that the octane number of motor fuels should not be the only yardstick for engine design. "As a word of caution, it is just as practical to design the car of tomorrow to operate at high efficiency on fuels of zero octane number," he said. Diesel power is giving a good account of itself in trucks and buses, he pointed out, and an increase in the use of diesel motors may be expected. "The high cost of fuel in Europe after the war will give impetus to diesel development for passenger cars," he said. Schlesman also named continuous-combustion systems (steam) and radiant energy from fuel burned inside gas mantles as possible future methods of automobile propulsion. "This latter method might allow 60 miles to a gallon at 60 miles an hour, burning either No. 2 fuel oil or 100-octane gasoline," he said.

Automotive Engineers Look At War, Postwar Problems

DETROIT, Mich.—A practical wartime engineering conference with "postwar implications" is the purpose of this year's annual meeting of the Society of Automotive Engineers, according to an announcement by John A. C. Warner, executive secretary and general manager. The national organization meets at the Book-Cadillac Hotel here, January 10 to 14.

Upwards of 25 discussion sessions are planned with technical papers on aircraft and aviation engines, diesels, fuels and lubricants for all types of internal-combustion engines, transportation and maintenance, postwar plans, designs and requirements for aviation and automotive equipment. Looking toward postwar problems will be papers discussing the application of aluminum, magnesium, plastics, steels, synthetic rubbers and other new and old but specialized materials for the cars and trucks, buses and planes of the future.

The meeting will be divided between immediate problems of speeding and correlating war production and planning for postwar matters. Designs and capabilities of postwar cars, trucks, etc., will be discussed at length, and the job of planning peacetime production to utilize all materials to the utmost will receive attention. The society's membership has reached an all-time high of about 10,000.

Carter Posts New Price for Pickens Field Crude Oil

The Carter Oil Co. has posted a new price schedule, effective December 30, 1943, for crude oil purchased in the Pickens field of Madison and Yazoo counties, Mississippi.

Posting starts at 86 cents for 24 to 24.9-gravity crude, with a 2-cent differential up to a maximum of $1.18 for 40-gravity and above. These prices are based upon the use of 100 per cent tank tables in computing the volume of oil purchased.

Material Rise in Gasoline Demand Expected in 1944

WASHINGTON, D. C.—Rising war demands will materially increase total demand for motor fuel in 1944, the Bureau of Mines declared this week in a preliminary analysis of petroleum requirements over the next 12 months and for the past year.

Total demand for motor fuel last year, the bureau estimates, was 623,000,000 bbl. Despite the curtailment in civilian consumption, total demand in 1943 compares with 624,200,000 bbl. in 1942. Approximately 6,000,000 bbl. of motor fuel were withdrawn from storage in order to supplement the new supply of 617,000,000 bbl. from refineries, from natural-gasoline plants and received as imports.

Gasoline demand in January is projected at 50,100,000 bbl., which should permit, the bureau forecast indicates, a net addition of 7,400,000 bbl. to inventory. Refinery production is calculated at 55,700,000 bbl. for the month and 2,300,000 bbl. are anticipated from natural-gasoline blending and imports.

Total demand for all oils in 1943 reached an all-time peak, showing a gain of almost 7 per cent over 1942 and an increase of about 5 per cent above the previous peak of 1941.

The bureau's cumulative forecast of total motor-fuel demand in 1943 was 610,000,000 bbl. This is about 2 per cent below the estimated actual. The larger demand was owing to rapidly expanding military requirements and was met by larger withdrawals from inventory than was anticipated. Quarterly demand for motor fuel and crude oil was more erratic than had been anticipated, being considerably lower in the first quarter, higher in the second and third quarters and somewhat lower than forecast for the fourth quarter.

Crude-oil requirements in January are estimated at 4,364,500 bbl. daily which, with an estimated average of 277,550 bbl. daily of natural gasoline and condensate, indicates a net supply of 4,642,050 bbl. of new domestic petroleum daily.

The daily average supply of domestic crude oil estimated by the bureau to meet the market demand for January is 4,364,500 bbl., 582,500 bbl. higher than the abnormally low requirements for January 1943.

The bureau estimates 1943 production at 1,503,000,000 bbl., or 4,118,000 bbl. daily. The production of crude oil is 8 per cent greater than in 1942 and 7 per cent above the previous peak of 1941.

Direct sales of gasoline and imports are estimated at 2,300,000 bbl., making an indicated refinery production of 55,700,000 bbl. Application of the refinery yield, projected at 38.3 per cent on crude oil charged to stills, to straightrun and cracked gasoline production of 50,100,000 bbl. gives total crude runs of 130,800,000 bbl., or 4,219,400 daily for January operations.

DEMAND FOR MOTOR FUEL AND CRUDE PETROLEUM, 1939-1943
(Millions of barrels unless otherwise noted)

	1939	1940	1941	1942	1943*
Motor fuel:					
Total demand	600.1	614.5	624.6	624.2	623.0
Change finished gasoline stock:					
Increase	11.4	.5	8.5	....	....
Decrease	....	....	....	15.4	6.0
New supply:					
Straightrun and cracked	556.9	557.8	623.3	530.4	530.0
Natural, etc., blended	39.6	39.5	47.3	56.8	62.0
Other natural and imports	15.0	18.2	32.0	21.8	25.0
Total	611.5	615.5	703.1	608.8	617.0
Yield from crude, per cent	45.0	43.1	44.2	39.8	37.1
Crude petroleum:					
Runs to stills	1,237.8	1,294.2	1,409.2	1,334.1	1,427.0
Daily average†	3,391	3,536	3,861	3,655	3,910
Domestic crude to stills	1,204.3	1,252.4	1,358.3	1,319.5	1,416.0
Exports, fuel and losses	97.3	77.9	62.2	76.7	80.0
Total demand for domestic crude	1,301.6	1,330.3	1,420.5	1,396.2	1,496.0
Daily average†	3,566	3,635	3,892	3,825	4,099
Change stocks of domestic crude:					
Increase	....	22.9	....	....	7.0
Decrease	36.6	.....	18.3	9.6	.....
United States production	1,265.0	1,353.2	1,402.2	1,386.6	1,503.0
Daily average	3,466	3,697	3,842	3,799	4,118

*Estimate based on 10 months actual and current figures available for November and December. †Thousands of barrels.

Gallagher to Direct Flow of Motor Fuel Supply in District 5

WASHINGTON, D. C.—A decline in stocks of motor fuel on the Pacific Coast is approaching a critical state in the opinion of PAW officials.

A recent resurvey showed actual inventories of usable gasoline to be considerably below previous estimates and stocks are now felt to be little above safe working margins. Apparently in preparation for actual shortages at service stations, Administrator Ickes has authorized Herbert R. Gallagher, director in charge of District 5, to institute a system of preference ratings for deliveries of motor fuel, similar to that used last year in the East Coast region.

The director is authorized to issue specific directions to any person or supplier in District 5 with respect to the delivery or withdrawal of motor fuel, giving preference to service stations designated as war service stations by the Army or Navy; individual consumers holding certificates of war necessity issued by the Office of Defense Transportation when requested by the ODT; and consumers who use motor fuel in services indispensable to public health and safety.

Magnolia Extends Gravity Postings on West Texas Oil

DALLAS, Tex.—Effective 7 a.m., January 1, Magnolia Petroleum Co. posted the following prices for crude oil purchased in Lea County, New Mexico, and in West Texas counties of Crane, Upton, Howard, Glasscock, Mitchell, Winkler, Cochran, Hockley, Yoakum, Gaines, Pecos and Andrews: Below 20 gravity, 70 cents, with a 2-cent differential per degree of gravity beginning with 72 cents for 20 to 20.9 up to a top of $1.12 for crude of 40-gravity and above.

Previously the company's West Texas posting started at 80 cents for 25 gravity and below.

THIS WEEK

SUPPLIES—Gasoline supplies on Pacific Coast reaching critically low level. . . . Current inventory represents minimum working requirements. . . . Contraction of A coupon values, tighter control of supplemental rations considered imminent. . . . H. R. Gallagher, PAW District 5 director, authorized to establish priority system on motor-fuel deliveries. . . . ¶Gradual improvement of East Coast inventory position continues, no relaxation of restrictions yet in sight. . . . ¶Freer movement of tankers, high rate of launchings, may cushion shortages on both coasts. . . . Uncertainty of military demand for tankers, however, leaves outlook for relief on unreliable terms. . . .

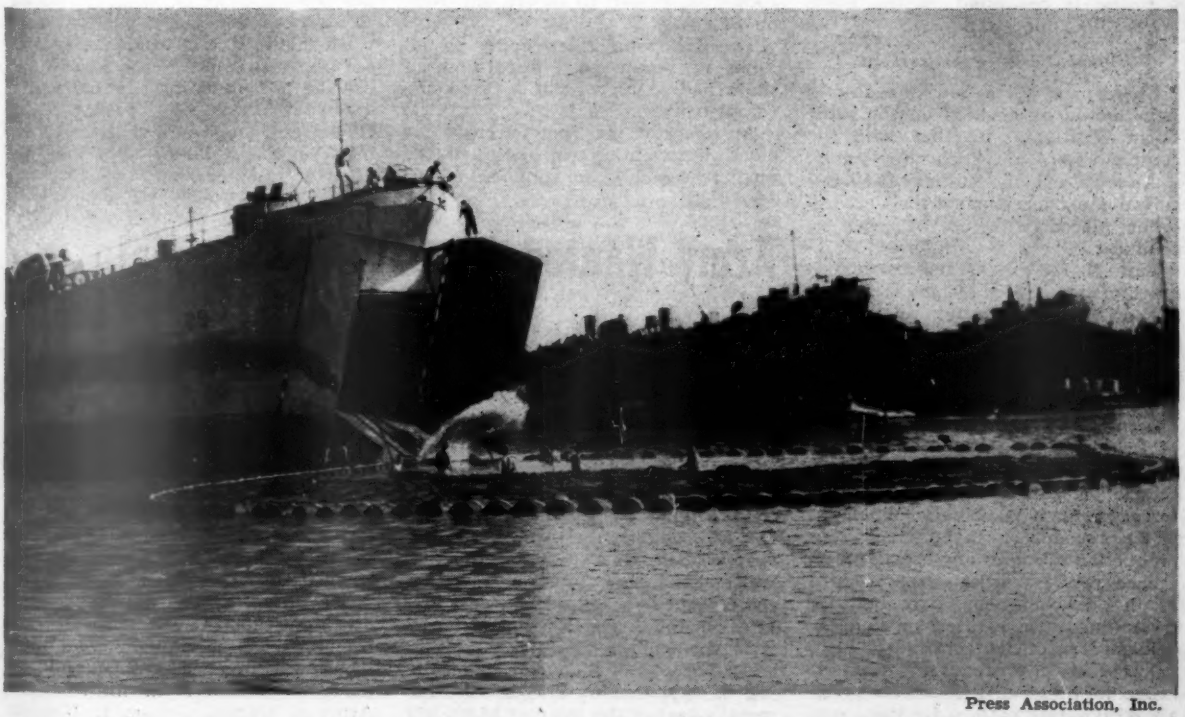
TRANSPORTATION—Agitation gains momentum for converting one WEP big-inch line to natural-gas transmission service. . . . Plan would shift Tennessee Gas & Transmission Co. project from entirely new line to one already in place. . . . ¶Strong opposition anticipated from eastern coal interests, possibly from Middle West refiners. . . . More crude-oil capacity than now in sight may be necessary to keep District 2 refiners supplied over extended period. . . .

DRILLING—Tentative figure places nation's well completions at 18,091 for 1943, including 13 per cent wildcats. . . . Exploratory-well ratio projected at 20 per cent of 1944's program for 25,000 completed wells. . . . ¶Contractors agree material situation easing slightly, BUT drain on manpower continues with warnings of disaster ahead, unless stopped. . . . Proposal made to classify all members of drilling crews as essential to halt further inroads on skilled personnel. . . . ¶PAO 11 modified, permitting greater freedom in rework jobs and dual completions. . . .

DEMAND—Sharp rise in motor-fuel demand this year forecast by Bureau of Mines. . . . Tentative demand for 1943 calculated at 623,000,000 bbl. of gasoline, down only 1,200,000 from 1942. . . . Demand for all oil reached all-time peak in 1943, gaining 7 per cent over 1942, up 5 per cent from previous peak in 1941. . . . ¶Major decline in stocks of all oils occurred in California. . . . Position east of Rockies substantially unchanged. . . .

REFINING—Engineering and material-procurement work 80 per cent finished on 22 plants remaining on PAW's 100-octane program. . . . Completion of construction pledged before year ends. . . . ¶Appeals broadcast for skilled workmen to hasten construction, particularly in Rocky Mountains. . . .

PRODUCTION—Texas fields produced estimated total of 587,758,690 bbl. of crude oil in 1943, nearly 40 per cent of nation's aggregate. . . . Bulk of increase came from West Texas where output rose 16,685,650 bbl. over 1942 level. . . .



Press Association, Inc.

Conventional unloading techniques disappear in the war zones. Using northwestern logging methods, oil drums from an LST (Landing Craft Tanks) are dumped into the water off Apamama atoll, Gilbert Islands, and caught in a circular floating raft for movement to the shore

Operators Told How to Procure Equipment Under Order L-192

WASHINGTON, D. C.—Instructions on priority procedures for obtaining construction machinery by the oil industry under the terms of Orders P-98-b and L-192 were distributed last week to district offices by the Petroleum Administration for War in PAW Priorities Circular 16. Salient points in the instructions are:

In order to obtain an item on Schedule A of L-192 a petroleum operator must file an application for authority covering the item on Form WPB-1319. It should be filed in quintuplicate with the district office of the Petroleum Administration for War for the district in which the item is expected to be used.

In addition to authorization, an operator will need a preference rating. A rating can also be applied for on the same Form WPB-1319 on which authorization is requested. As a consequence (in order to eliminate duplication of filing), it will not be necessary to also follow any procedure of P-98-b to obtain such item for which a rating is requested on the Form WPB-1319 application.

Spare Parts' Procurement

Spare parts for a new Schedule A item should be covered on the same Form WPB-1319, together with the complete item to which they apply.

A copy of any authorization received must accompany the delivery order placed with the supplier or producer.

Since L-192 places no restrictions on the acquisition of any item on Schedule B of that order, a petroleum operator will simply follow the appropriate normal procedure of P-98-b to obtain such an item.

With the recent removal of items of construction machinery from List B of Priorities Regulation 3 it is possible to use the regular MRO procedure of P-98-b, where applicable, to secure such machinery. When the MRO procedure is inappropriate, the production rating or any specific preference rating application procedure, as the case may be, may be used depending upon the circumstances.

Regardless of the fact that the MRO or production procedure is used, in order to preserve the present overall WPB rating pattern for these construction machinery items, most items costing more than $500 on delivery orders submitted to PAW for prior approval will be rated by PAW at lower than AA-1. It is very likely that a AA-3 rating will be assigned.

Such rating assigned is expected to be high enough to obtain the items on time, but if any difficulty is encountered with respect to delivery, the orders (two copies) should be resubmitted to PAW for a higher rating with a statement of all of the facts, including most of the information required for an uprating by Section 7 of the instructions for PAW Form 30.

Petroleum operators may not place orders for new items on Schedule C of L-192.

L-192 forbids the manufacture of items of Schedule D, although any such item already fabricated can be sold. Therefore, if an operator can locate any such item he should be able to purchase it without a rating. Being unable to replace the item, a supplier would have no use for such a rating. For that reason, it would not be necessary to use any procedure of P-98-b to secure any item on Schedule D.

The following rules apply to all items of repair parts regardless of the schedule on which is listed the complete item.

An operator may not purchase for stock or inventory (in excess of the amount required for any actual or impending breakdown or for maintenance of equipment in sound working condition) any repair parts for construction machinery unless he is so authorized after an application filed on Form WPB-1319 in duplicate with the Petroleum Administration for War, Washington 25, D. C., Ref.: L-192. The order gives further instructions on completing such an application. This constitutes a limitation on the rules of P-98-c permitting an inventory.

In order to request a rating for repair parts for any actual or impending breakdown or for maintenance of equipment in sound working condition an operator may always follow the regular MRO procedure of P-98-b.

Furthermore, where repair parts are required by a petroleum operator for equipment being used on a "project" to which a rating has been assigned by any order in the P-19 series, or pursuant to P-98-b after an application on Form PD-200, Form WPB-617, or PAW Form 30, the operator has the privilege of using the rating so assigned for such repair parts instead of the P-98-b MRO rating procedure. In this latter case, in order to use the project rating it is not necessary to follow any procedure of P-98-b and the rated delivery order may be placed direct with the supplier or producer.

Army Wanted Alaska Oil; Imperial Smashed Records and Got It

EVERY barrel of oil thus far produced or discovered in the Canol project of Alaska has come from wells located within the boundaries of the field originally opened by Imperial Oil, Ltd., Standard Oil Co. (New Jersey) affiliate, in 1920, when the first well was drilled. Imperial's part in the enterprise was to find new stores of oil in the Arctic North and to get it to the surface as quickly as possible. The cost of the entire undertaking is estimated at $134,000,000. Imperial's part of the job cost $5,000,000.

"Norman Wells was the only proved source of oil anywhere near Alaska," says Imperial in a booklet which tells that company's part in the project.

"Imperial had to find more oil there, said the Army. And Imperial had to get it up out of the earth at the rate of thousands of barrels daily. The Army would take care of bringing it to the Alaskan front. Could Imperial do it? Imperial could try.

"Secretly, without a wasted hour, drilling equipment was assembled, the right men picked. Both men and material were rushed to the railhead north of Edmonton in time for the Army to transport them to Norman Wells before lakes and rivers were closed by ice. By the end of 1942 the miracle had happened. More oil was

produced—enough to insure the Army's goal.

"'Good work!' said the Army, 'but now we want even more.' New quotas were set. Those quotas will be reached.

"The contract? It was 'cost' plus 'fee.' The fee was $1. Costs for the first quota, about $2,000,000; for the second quota, about $3,000,000. That's less than the cost of a single submarine. And even those costs are to be repaid to the Army in oil through a sliding scale of price.

"Imperial contracted to develop oil production of 3,000 bbl. a day from its leases, and from additional leases in that region, and to sell this oil to the U. S. Government at pipe-line terminals near Norman Wells. Subsequently, the Army increased its requirement to 20,000 bbl. a day. The original requirement has been met, and surveys are under way to develop further production.

Transportation Difficult

"Imperial immediately took charge of the operation, locating drilling equipment, finding and organizing personnel and arranging for transportation. River transport, then the only way to get most of the heavy equipment to the drilling sites, opens about June 15 and closes in September. The equipment, therefore, had not only to be found, but delivered within a few weeks to the railhead over 300 miles north of Edmonton.

"Some idea of the speed with which this project was carried out may be gained from the fact that within 2 months of the original discussions in Washington, Imperial had begun drilling on the first of the new wells.

"Actual drilling of the wells has provided additional data on the probable oil reserve at Fort Norman. It now appears that the field may exceed 35,000,000 bbl. Not all of this is accessible, since much of the oil-bearing structure lies under the bed of the Mackenzie River. Special drilling and production techniques are being tried.

"The sources of consumption for purposes other than military, are limited. There has been no market beyond the nominal amount produced in peacetime by Imperial. Increase in this market depends upon future development of the Northwest area."

Pure Oil Posts New Price For Bosco Area Crude

Pure Oil Co. has posted a flat price of $1.24 a barrel for crude oil from the Bosco area, coastal Louisiana, purchased and delivered for the company's account into the lines of Pure Transportation Co. or other authorized receiving agency. The new price is effective as of December 16, 7 a.m.

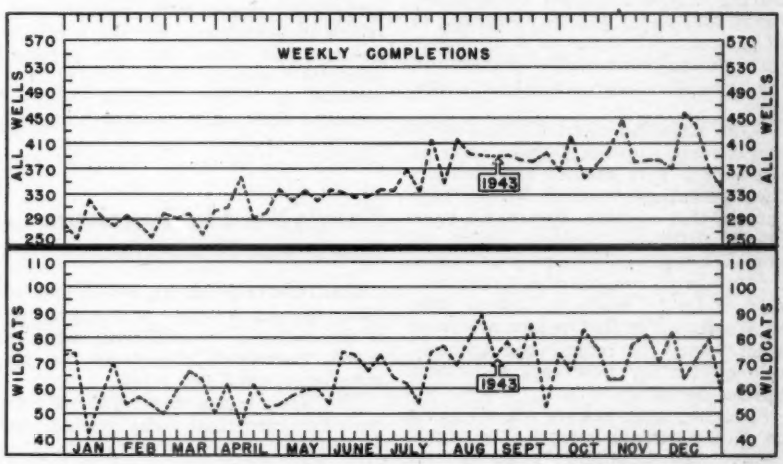
Journal Introduces New Feature Showing Trend in Completions

PRELIMINARY figures indicate that well completions in the United States last year totaled 18,091, compared with a 1944 program of 25,000. Included in 1943 operations were 3,491 wildcats, 13 per cent of all wells.

Drilling operations in 1944, as projected by the Production Division, Petroleum Administration for War, calls for 5,000 wildcat wells or 20 per cent of the total program.

Unqualified importance of drilling in the oil industry's ability to dispatch its wartime assignment this year prompts the Journal to give its readers a supplemental feature which will show at a glance the progress of well completions from week to week and the comparison with 1943 operations. Charted completions will appear weekly in subsequent 1944 issues on the Exploration and Drilling Summary page.

Lags in the system of reporting completions from isolated and less important areas introduce a minor factor of error in the weekly variations. Completions of all wells and of exploratory wells are charted as they are reported by the Journal's staff and show the general upward trend which prevailed during the final 9 months of 1943. The general increase in drilling operations is also reflected in the charted completions of exploratory wells.



Weekly progress of total completions and exploratory wells to which will be added the comparative 1944 figures in subsequent issues of the Journal. The feature will appear regularly on the Exploration and Drilling Summary page at the start of the field section

Tire Restrictions May Be Eased

WASHINGTON, D. C.—The possibility that restrictions on distribution of automobile tires to civilians may be relaxed by midyear was voiced here last week by Chester Bowles, price administrator. OPA hopes, Bowles said, to continue motor-fuel supplies at approximately the present level for civilians but warned that transportation will become an increasingly serious problem as more cars become unfit for service and with only 60,000 new vehicles to last through the emergency.

"The tire situation," declared Bowles, "remains the same. Passenger car tire quotas established by the rubber director are almost identical with those for December. As the situation stands today, the rubber director tells me that by midyear we may be able to relax the regulation somewhat as new synthetic tires come into the market for passenger cars.

"As a matter of fact, synthetic rubber itself is available in a growing volume. The present problem is how to get this rubber manufactured into tires fast enough to keep up with our wartime requirements. Tire recapping has been removed, as you know, from rationing. So be sure to

get your present tires recapped as soon as they begin to wear smooth.

"The truck-tire situation is really serious. In many respects it is the most serious shortage in the country today. The Army and Navy take two-thirds of all our truck tires at the present. There is no immediate relief in sight.

"The gasoline quota assigned to us for civilian use by the Petroleum Administrator for War for the first three months of the year shows a small cut. But the use of passenger cars and particularly the use of farm machinery decreases during the winter. As a result, at lease in most parts of the country, we should be able to maintain our gasoline coupons during January at their present values.

Unchanged Rations Sought

"However, we should all understand clearly that our gasoline problem continues to be acute. At present 36 per cent of all our gasoline is being used for military purposes. During 1944, the amount going to the Army and Navy will be increased to 40 per cent. We in the OPA are hopeful that we will be able to maintain the present coupon values for some time.

"Our rationing of new automobiles has become constantly more rigid as the supply gets smaller and smaller. Two years ago we had 500,000 new cars in this country. Today we have about 60,000—a number which in normal times would be sold in 5 days.

"This small reserve of new automobiles must be made to last as long as possible. For that reason we have been forced to reduce the automobile quotas for new cars somewhat during January.

"As cars wear out we are all going to face a serious situation on automotive transportation. During the last 2 years more than 3,000,000 passenger cars have been wrecked or become worn out beyond repair, with few replacements available. The number will increase at a constantly more rapid rate as the war goes on."

East Texas Land Changes Hands at $75,000 an Acre

DALLAS, Tex. — R. E. Smith of Houston, Tex., paid $1,500,000 cash to Tom B. Humphreys of Dallas for 20.32 acres of land, containing 36 wells, in the Van Winkle Survey, in Gregg County, near Kilgore, on the east side of the East Texas field. The property is the Angus B. Spear tract. Humphreys purchased the lease in 1931. The price is approximately $40,000 per well, and it averages about $75,000 an acre which is unusually high for acreage in that part of the field. The acreage had been drilled to a density of one well for each half acre.

Air Expert Predicts Great Progress in Near Future

The remarkable advance made in airplane design and construction and in air travel in the past 25 years will be overshadowed by still more notable progress in the next 25, in the opinion of Dr. John E. Younger, engineer and author, who is to speak before a joint meeting of Engineers Club of Tulsa and the Mid-Continent section of American Society of Mechanical Engineers in Tulsa on January 17.

Doctor Younger, who has been a close student of aeronautics since World War I and consulting engineer to some of the large airplane manufacturing companies, declares predictions that great air liners will ply the upper regions of the stratosphere at incredible speeds, with comfort and safety to passengers, are not a broad guess. It is something the present generation will see. New ideas of fabrication, at present beyond comprehension, will make present methods appear as crude as those of a quarter-century ago, he says.

Navy's Need for Petroleum Specialists Unsatisfied

The rate of procurement of petroleum specialists must be stepped up if the Navy is to fulfill its requirements, recruiting officers in the oil country stressed last week.

The Navy needs three types of petroleum specialists who would be commissioned as officers in the United States naval reserve.

The most pressing need is for oil-terminal supervisors. Candidates must have had at least 5 years' experience in handling bulk fuel oil and at least 2 years' experience in a water-terminal storage plant in a supervisory capacity. Candidates must have a knowledge of loading and unloading ocean-going tankers.

There is still a critical need for petroleum engineers. These men should hold a degree in petroleum or mechanical engineering. Ten years' experience in a responsible position in an oil refinery or laboratory work in connection with fuel oil or its derivatives will be considered equivalent to a degree.

Index Available

The complete editorial index of The Oil and Gas Journal for 1943 will not be incorporated in a regular issue, but will be printed separately. This 1943 index will be sent without charge to all subscribers requesting a copy by January 10. Only as many copies will be printed as there are requests at the time the index goes to press. This is made necessary by the paper shortage. Address requests to Circulation Department, P.O. Box 1260, Tulsa.

Motor-Fuel Supply in California Declining

BAKERSFIELD, Calif. — A cut of nearly 20 per cent in motor-fuel consumption on the Pacific Coast is indicated on the basis of projected supplies and requirements to cover outstanding rationing coupons. The supply and demand situation was summarized here last week by Ralph K. Davies, deputy petroleum administrator, in an address here before the San Joaquin Valley Oil Producers Association which held its annual dinner meeting December 28.

California motor-fuel stocks, Davies warned, have fallen to what is regarded as minimum working levels and governmental demands for oil from the Pacific Coast territory are still increasing with the peak not yet in sight.

Davies said that the short-supply position is being alleviated to some extent by transfer of approximately 40,000 bbl. of products daily from other districts. His audience assumed that reference was to current tank-car shipments from Texas to Pacific Coast terminals.

Present allocation of gasoline for civilian use in District 5 is about 134,000 bbl. daily, but consumption in November probably exceeded that by 15,000 to 20,000 bbl. and it is estimated that there are enough gasoline coupons out to call for 165,000 bbl.

Preliminary Work Nearly Finished on New Plants

WASHINGTON, D. C. — Petroleum Administrator Ickes announced this week that engineering work and purchase of materials for the 22 100-octane aviation-gasoline plants in the 1944 program are 80 per cent completed.

Actual construction work is well under way and all 22 plants are scheduled to be on stream by the end of the year, completing the PAW aviation-gasoline program.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

Democracy at Work

A SMALL part of one floor of a Washington, D. C., building houses an organization which is unique among the major war agencies. It is the press division of the Office of Censorship.

Over the past two years this office has been charged with the responsibility of seeing that the wire and other news services, thousands of newspapers and trade magazines and hundreds of periodicals and reports did not "give aid and comfort to the enemy" in publishing information of every conceivable type.

The press division has two private offices and a 20-ft. by 60-ft. room. The personnel consists of the director, the head of the press division, and eight well-qualified representatives of the working press from all parts of the country. Four typists and clerks complete the staff, which has no legal counsel. The 1944 budget is $75,462. This is all there is to the press division of the Office of Censorship.

When the censorship office was about to be established after Pearl Harbor there were those who visioned a large Washington headquarters, with district offices throughout the country. There were to be thousands of employes, who would rigidly enforce numerous regulations.

Fortunately, Director Byron Price and his advisors insisted that the program which has been in effect be given a trial. A voluntary Code of Wartime Practices, consisting of approximately 4,000 words, was adopted. The duties of enforcement were placed with the publishers. Editors were told to ask themselves regarding any detail, "Is this information I would want if I were the enemy?"

It has functioned so well that those responsible for the code have liberalized its provisions twice. It was founded on the knowledge that the press is loyal and more competent to direct its own activities than any outside agency. Its success has revealed what can be done when democratic principles continue to operate during an emergency.

Millions of the tax and bond money have been saved. Members of the press, except those called to military service, have been able to stay at their work instead of joining a war agency designed to police their profession. Freedom of the press has been retained and the voluntary pattern means that the office will end the day peace is declared.

What has this to do with petroleum? The answer should be readily apparent. The time has arrived to free the oil industry and all other business activities of many of the war-imposed regulations. In most instances the restrictions, assuming that they were ever justified, have served their purpose and what is needed now is removal of the brakes of regimentation so that full power can be applied.

So far as the oil industry is concerned war construction is nearing an end. The task ahead is largely one of operating these war facilities and at the same time expanding regular operations to take care of greater requirements. The freer oil operators in all divisions are to return to their prewar methods of doing things, the more certain it is that future responsibilities will be discharged in full.

Such a program will release thousands of men and women for war work. Operators who have become bogged down in governmental red tape can once more do their part minus delays and minus the fear of having violated useless regulations which are still being enforced. Furthermore, this simplification of operating procedure, effective immediately, is the first step assuring the return of this industry to its owners as soon as the war ends.

1944 — In Prospect

The Journal presents exclusive statements from oil-trade association presidents who were asked to express their views on the most pressing needs of the industry in 1944.

Imports Partial Answer to Imminent Shortage

W. R. BOYD, Jr., president American Petroleum Institute, chairman Petroleum Industry War Council.

THE United States will probably strain its productive capacity in 1944 and still be unable to produce enough oil to supply both our war machine and reasonably to satisfy our civilian requirements.

The facts are simple and should be clearly understood by everyone who cannot get the quantity or quality of gasoline or oil that he would like. A year ago we had only about 1,700,000 men overseas, but by next July that number will have risen to more than 5,000,000. Trebling our overseas army obviously trebles the requirements for fighting oils. Can our oil production be trebled or even doubled? Not a chance.

In 1941 our crude-oil production amounted to about 1,402,000,000 bbl.; in 1942 not quite so much, and in 1943 our straining 405,000 wells produced only about 1,500,000,000 bbl., an increase over 1941 of only a little over 6 per cent as compared with the 200 per cent increase in our overseas forces. And the Petroleum Administration for War says that at this late date it will be a miracle if the oil fields of the United States can produce throughout the year at the 4,707,150-a-day rate required for January alone.

This situation means that during 1944 the primary cause of public inconvenience as regards oil will still be the war, but the secondary cause will be lack of crude petroleum, which cannot be remedied as easily or as promptly or as cheaply as was the lack of transportation facilities in 1942 and the shortage of refining capacity in 1943. New oil fields simply cannot be found by the same procedure that builds pipe lines, tankers and refineries.

Part of the answer will be found by drawing on all possible foreign sources for some of our military requirements as well as for some of our civilian needs. Another part will be found in the drilling of more than the 1943 total of nearly 19,000 wells in known oil fields of this country and in the search for new fields. But it now appears that most of the answer, particularly on the West Coast, which is already importing oil from Texas, must be found in the reduction of both the quantity and quality of civilian gasoline.

Chief Needs Are Price, Material and Manpower

N. W. SHIARELLA, president Kentucky Oil and Gas Association.

THREE great shortages exist, and it is becoming more apparent daily that unless the oil and gas producers in Kentucky can get immediate relief in the form of an adequate price for crude oil and its products, adequate materials and adequate manpower, new drilling operations and production will decline sharply during 1944. Many drilling rigs are now idle due to the shortage of drilling crews, drill pipe, and other necessary supplies. Unless immediate relief is given to oil-field truckers their equipment will be worn out and then no rigs will be running. This condition is critical in this area.

The producers must receive an increase in the price for crude oil if they are to survive the coming year. Many wells are being abandoned prematurely in Kentucky because of the low oil price, and with this premature abandonment large reserves of oil are lost.

If during 1944 the producers are given an adequate price, and if they can get the supplies and manpower needed, there will be more exploratory wells drilled in Kentucky than ever before, and I feel reasonably certain that all production records will be broken. Many water-flood projects will be started which will further increase the daily production at a time when the nation needs it.

All these ills can be corrected if certain men in Washington would forget their pet theories and give the boys in the field the necessary tools to do a job that they have proven they are more than willing to do, and that is to provide the necessary crude oil and its products for our military and essential civilian demand.

Extended Fractionation Apt To Stay in Natural Gasoline

JAMES W. VAIDEN, vice president Skelly Oil Co. and president Natural Gasoline Association of America.

TRENDS toward diversified operations in the natural-gasoline and condensate industries which were becoming noticeable in 1940 have been so greatly stimulated by war activities that 1944 should see many of them crystallized into standard activities. I refer particularly to the trend toward more extended fractionation of natural gas and gasoline into its component hydrocarbons to meet demands for aviation fuels, synthetic rubber, chemicals, etc. In some types of natural-gasoline plants these processes may result in partial independence of usual refinery markets through the manufacture of finished products for further processing. This is already true in most of the condensate and cycling plants.

This year should eliminate many of the uncertainties in the permanence of these production trends as more definite information on the quality and quantity of postwar motor and aviation fuels is made available. It is already evident the natural-gasoline industry will no longer be merely a purveyor of "volatility" but is to be also the source of many highly desirable raw material fractions for other industries. In the event these trends materialize, as now seems possible, even small and isolated plants may feel the need to modernize to

make the most valuable use of raw materials.

The war has forced heavy withdrawals from existing crude reserves and if the administration continues its present policy of refusal of inducements for expansion of these reserves large volume importation of crudes will be inevitable. This movement of oil may be necessary in the coming year. Most of the crudes available for importation are of heavy variety, requiring the addition of light ends, and while this would be of benefit to the natural-gasoline and condensate industries, I am sure we would rather depend on usual markets than to fill this need.

All of the present trends will make of the natural-gasoline and condensate industries two of the greatest of all natural-resource conservation agents as more and more of the desirable fractions are converted to useful products. In many ways 1944 is one of the most critical but promising years in the history of the two industries.

Public Education Essential to Curing Price Ills

RALPH T. ZOOK, president Independent Petroleum Association of America.

THE job of the oil producer during 1944 is to do everything in his power to furnish oil so badly needed to supply the fighting forces and minimum rationed civilian requirements. This is no time for either complacency or discouragement. The job must be done. One group in the industry is saying, "Oh, well, the Senate will pass an oil bill of some kind. I am not going to bother about it. Let some one else do the work."

Another group is saying, "Yes, I know the House has passed the Disney bill, but what about the Senate? Even if it passes that body, the president will veto it. There is no use in trying to do anything about it."

The same expressions were heard when members of Congress were securing the 218 signatures necessary to bring the bill before the House and again during the interim period before the bill actually came up for debate. The bill passed by a 2-to-1 vote for the simple reason that the legislators appreciated the seriousness of the oil situation.

The job in the Senate is going to be more difficult, and the situation calls for still more work. It is the continuous, day-to-day plugging that will bring results — plugging that is not swayed by good news, bad news or rumors.

The job is educational. The oil industry knows why an increase in crude-oil prices is necessary, why more manpower and materials are required to supply the oil needed; but too much time and energy are spent in telling the story to itself. It must be told to states outside of oil-producing areas.

This was shown clearly by such expressions as the following when the Disney bill was being debated on the floor of the House: "Fuel oil in my district has advanced 3 cents per gallon during the past year and this bill will double that amount." "This country has 13 years' oil supply." "The oil companies are making more money than any time in their history." "Crude-oil production in the United States has never been greater."

All of those statements must be answered, and no one else can do it as well as members of the oil industry. Right now the facts must be given to the public and to members of the Senate. Ask your congressmen and senators to inform senators from nonoil-producing states.

If the nation fully realized the oil shortage facing it during 1944, there would be no question of a price for crude oil that would allow the producer to get started on the only road that can cure this shortage, namely, the drilling of more wells in proven areas; stopping the premature abandonment of stripper wells; more wildcats and more secondary-recovery operations; fewer Canol projects and money used instead to develop reserves where the dollar invested would bring a thousand times greater returns.

It takes time to increase oil production. When the acute shortage is upon us it will be too late. Regardless of whether our Allies are furnishing their share of oil and products, if they are not sufficient to carry on the war, the result will be disastrous.

The independent oil producer has other problems besides an adequate price for crude oil. He is strongly opposed to government participation in the oil industry in either domestic or foreign fields. He is concerned lest increased foreign oil production developed under the demand for petroleum products to carry on the war may be used against him at the end of the war to dominate and control the domestic industry. He is in need of an adequate allocation of manpower and materials.

Whatever the job, he will meet it. The producer has no thought of "striking." His one thought is to do that job for which he is best fitted—the production of crude oil.

Suppliers Becoming Current On Oil Equipment Orders

F. J. SPANG, president Petroleum Equipment Suppliers Association.

THE varied and intricate products of the petroleum-equipment industry make it impossible for any one person, even under normal conditions, to predict its activities for any future period of time.

I feel that the industry is making considerable progress in becoming current in the meeting of the essential demands for operating supplies for the present rate of field activity. The continuation of this progress is to a great extent dependent upon an orderly even flow of raw materials and assemblies in sufficient quantity and in time to fabricate for use when needed.

Expansion of output for greater field activity is closely related to raw material supplies as well as the military requirements and manpower situation and any increase must take these into consideration.

The petroleum-equipment manufacturers are contributing much to the war effort and desire to continue this contribution, but supplying the petroleum industry with its needs is their business and they will let none of its needs exist without putting forth every possible effort to meet them.

Manpower Is Gravest Need in Exploration

A. RODGER DENISON, president American Association of Petroleum Geologists.

THE greatest need in exploration in 1944 is "manpower." The exploration branch of the industry has lost unskilled and semiskilled employes to the armed forces and other defense industries with a higher wage rate. It has lost skilled workers, technicians, and professional employes to research laboratories and the Army and Navy, as well as the other governmental agencies.

The average loss is no doubt near 25 per cent for all grades, while in some of the special classes the loss is 50 per cent. Shortages of materials particularly for geophysical work have interfered with operations. These shortages of manpower and materials come at a time when there is the most serious need for expanded exploration in the entire history of the petroleum industry. No one knows

(Continued on page 34)

Multizone Completion and Reworking Restrictions in PAO 11 Relaxed by PAW

by Henry D. Ralph

WASHINGTON, D. C.—Slight relaxation in drilling restrictions and use of critical materials in production operations is accomplished by a revision of Petroleum Administrative Order 11 approved by Petroleum Administrator Ickes January 1 and effective immediately.

Ickes said the relaxation is all that can be permitted at present by the supply of materials available to the industry and will be particularly helpful to operators in reworking wells and making multizone completions in existing fields.

Provisions of Amendment

Salient new features of the amended order are:

1. In drilling for oil on sectionalized land within 2 miles of any other drilling or producible well, the well shall be located on the quarter-quarter section within 150 ft. of the pattern well location and at least 300 ft. from quarter-quarter section lines.

2. The minimum distance requirement between wells on 40-acre spacing must be reduced from 990 ft. to 900 ft. This will provide greater flexibility to operators in locating wells on the drilling unit.

3. Unless specifically prohibited by an exception or supplemental order, any well may be reworked or plugged back and recompleted in a shallower pool penetrated by the well. This provision applies throughout the United States except in California where the conditions under which wells may be reworked or plugged back are covered by Supplementary Order 4.

4. Any well may be deepened and recompleted in a deeper pool if the well, with respect to the pool or pools in which it is recompleted, conforms to the quarter-quarter section or 40-acre spacing requirements of the order, except that a pattern location need not be followed.

5. Pumping or other artificial-lifting equipment may be installed on wells which have been deepened to lower pools pursuant to the order, and it may be interchanged in its entirety between wells on the same lease. Additional tubing or sucker rods may be installed on any pumping well.

6. Condensate fields are included within the newly defined term "restricted area." Drilling of all wells in "restricted areas" must be by exception unless commenced prior to designation of the area as a "restricted area."

7. Gas-gathering systems may be constructed provided material cost does not exceed $5,000 and existing facilities are not duplicated.

Distribution and Supply Activities Reorganized

WASHINGTON, D. C.—The Petroleum Administration for War is moving to put into effect a long-discussed plan for reorganizing its supply and distribution activities and splitting these between its marketing and transportation divisions.

So far the PAW organization itself has not been changed. The reorganization is starting at the bottom with the district industry committees.

Chairmen of the five district general committees have been instructed by Deputy Administrator Davies to dissolve their existing supply and distribution subcommittees, and to reorganize their transportation and marketing committees. In most cases this may involve numerous personnel changes, since these committees will have enlarged functions but membership is to be held to a maximum of 12 each.

The old marketing committees henceforth will be known as marketing and distribution committees, and will have responsibility for distribution of petroleum products from terminal supply points to consumers. The old transportation committees are to be known as transportation and supply committees, and will have responsibility for all functions of transportation and supply to and including delivery to terminal points.

A similar reorganization is contemplated for the PAW Washington and district offices, involving elimination of the supply division. The supply division and the district supply and distribution committees were created somewhat as emergency measures at a time when rapid action was required to distribute available supplies equitably and to prevent shortages from disturbing war activities, and to some extent the committees crossed the lines of jurisdiction originally laid out for the transportation and the marketing committees. The new setup will follow more closely the organization plan of the oil industry itself and of most integrated companies.

Old-Type Gasoline Coupons Invalidated to Bar Fraud

WASHINGTON, D. C.—Office of Price Administration has declared two old types of gasoline ration coupons invalid for consumers, beginning January 1, 1944, in order to prevent their illegal use. They are:

1. Transport ration coupons (principally used by commercial vehicles and taxis) bearing the designation "TT." After January 1 transport rations take the form of the new serially numbered "T" coupons.

2. One-gallon "bulk" coupons that were used at one time for bulk deliveries of gasoline and for furlough travel by members of the armed forces.

Dealers have until January 10, 1944, to dispose of these ration coupons either by furnishing them to their suppliers when replenishing their stocks or exchanging them at their local boards for inventory coupons. Gasoline suppliers have an additional 10 days in which to deposit this old ration currency in their ration bank accounts.

While most of this old-type gasoline ration currency has already expired, a few consumers may still have coupons of these types that were issued for use after January 1. These persons must exchange them either by mail or in person at their boards for new-type coupons to meet their needs for the remainder of the ration period.

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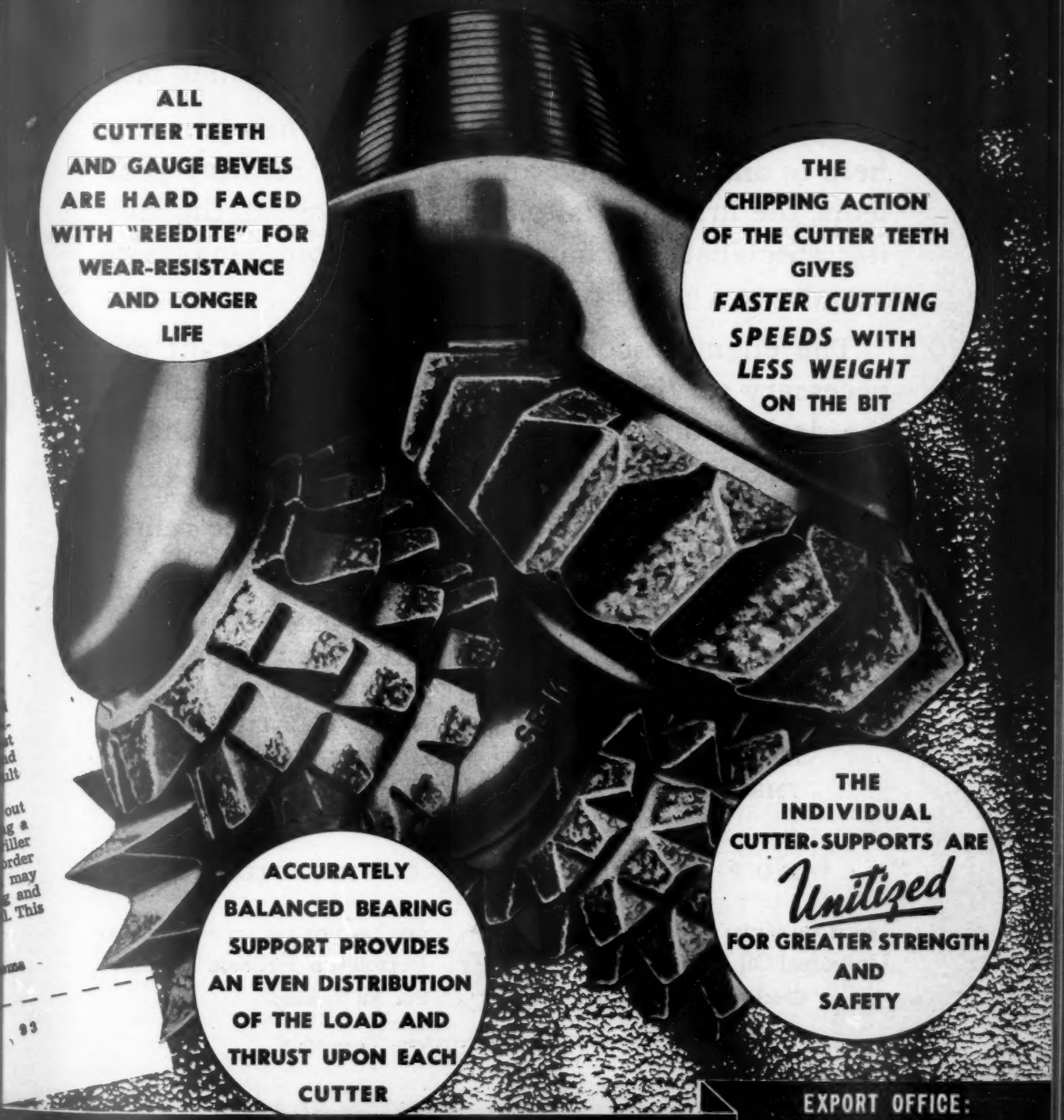
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Engineering and Operating

"Grain" Alcohol From Cracked Hydrocarbon Gases

by Arch L. Foster

Synthesis of ethyl (grain) alcohol from cracked still gases in the petroleum refinery is not a new trick, it having been carried out numberless times on a small scale. Only recently was this important petrochemical reaction adapted to commercial production. This article, which is the first of a series on the manufacture of chemicals from petroleum hydrocarbons, gives the major details involved in the synthesis.

THE first ethyl alcohol plant operated by a petroleum refinery, and the second industrial organization to synthesize this important alcohol from cracked hydrocarbon gases, started production last March (1943) at the rate of 70,000,000 wine gallons (231 cu. in.) per year, as an adjunct unit to the refinery of Standard Oil Co. of California at Baton Rouge. This plant utilizes ethylene gas, available in large quantities in cracking still gases but here cracked specially from special ethane-propane stock gases, and water as raw materials. The process is essentially one of hydration of the ethylene.

Standard Alcohol Co., a subsidiary of Standard Oil Co. o f New Jersey, started the manufacture of isopropyl alcohol, from cracking still gases, far back in the 1920s. One of the amazing anomalies of nearly 20 years ago was the fact of this country shipping synthetic alcohol to Germany, formerly the greatest chemical manufacturing country of modern times. It was not until the late '30s, however, that a satisfactory pilot-plant operation for making ethyl alcohol from ethylene was developed, and a commercial-scale plant was designed finally and built at Baton Rouge.

The essential steps of the process are shown in the flow chart, Fig. 1. Ethylene gas, C_2H_4, is formed by cracking refinery gas in a special unit, is scrubbed and purified to a set standard of concentration and is brought into contact with concentrated sulfuric acid of 90 per cent or higher by which mono- and diethyl sulfate esters are formed. The mixed esters are pumped to a hydrolyzer column and mixed with measured amounts of water which decomposes the esters into ethyl alcohol, diethyl ether, and small quantities of other byproducts. The hydrolyzed mixture is sent to a fractionator column and heated with steam, vaporizing the alcohol and ether overhead with a portion of the water; the remaining water and the dilute regenerated acid are withdrawn from the tower bottom, pumped to a concentrator tower, a large portion of the water is removed overhead and the reconcentrated acid returned to the system in the absorber column.

The crude alcohol-ether-water mixture is scrubbed with caustic soda solution to neutralize any traces of acid carried over in the separator column by entrainment. The alcohol and ether vapors may be condensed or may be sent directly into a fractionator tower where at temperatures between the boiling points of alcohol and ether the ether is removed, condensed and disposed of an anaesthetic

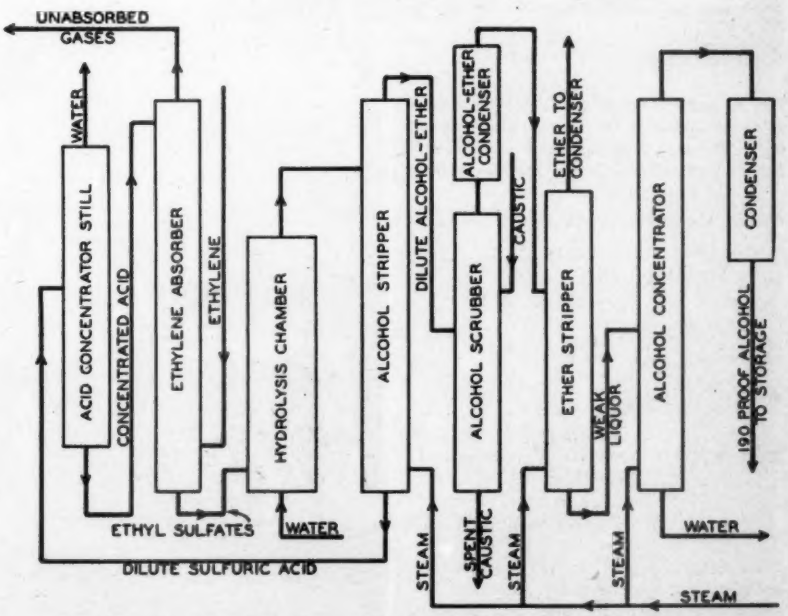


Fig. 1: Simplified flow chart of Standard alcohol process by which ethylene from cracked gases is converted to ethyl alcohol by esterification-hydrolysis method

or as industrial ether. The ether-free alcohol-water mixture next passes to a very efficient, large-capacity fractionator column where it is heated with steam under the most carefully controlled conditions and with heavy reflux, to drive off overhead nearly pure alcohol of 190-192 proof (95-96 per cent) and water is drawn off at the bottom, containing only a small percentage of alcohol. This alcohol stream is used at present only for industrial and commercial purposes and it must be denatured to escape the beverage-alcohol tax of the federal Government.

The reactions involved in this synthesis are believed to be as follows:

$$\underset{\text{Ethylene}}{\overset{H\,H}{HC=CH}} + \underset{\text{Sulfuric acid}}{H_2SO_4} = \underset{\text{Ethyl acid sulfate}}{\overset{H\,H}{HC\text{-}C\text{-}HSO_4}} \qquad (1)$$

and,

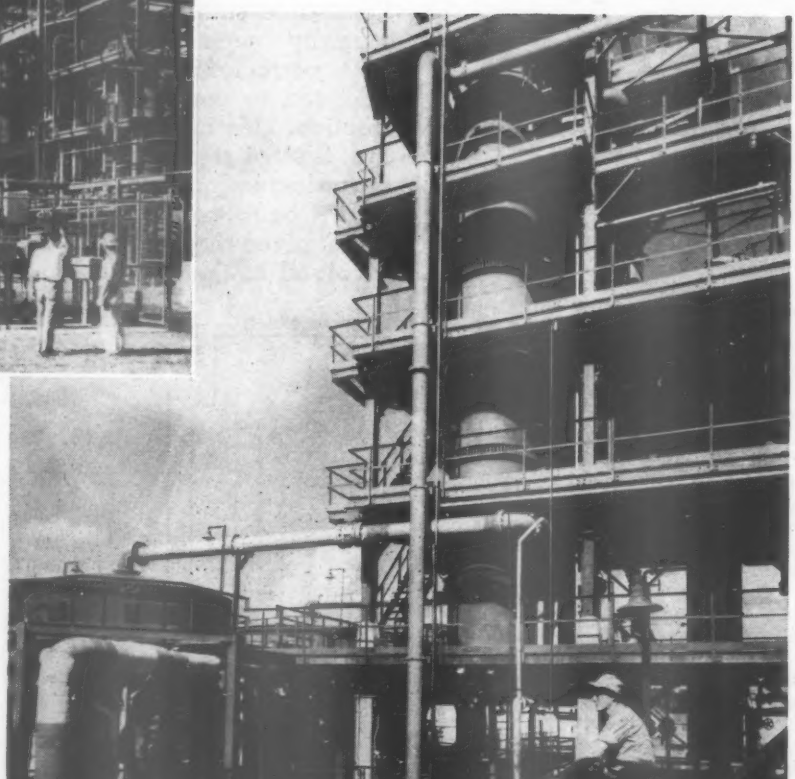
$$2\overset{H\,H}{HC=CH} + H_2SO_4 = \underset{\text{Diethyl sulfate}}{\overset{H\,H}{(HC\text{-}C)_2}=SO_4} \qquad (2)$$

In either equation (1) or (2) the subsequent hydrolysis reaction is the same (1) producing one molecule of alcohol, (2) forming two molecules, as follows:

Fig. 2, right: Workman directing the fractionation of alcohol-water mixtures by which alcohol is concentrated in this large alcohol tower

Fig. 3, below: Reaction system for synthetic ethyl alcohol is shown at right, while the concentrator tower, or fractionator, which removes most of water in crude alcohol, is shown at left

Fig. 4, right: Stripper tower in the alcohol plant of Standard Oil Co. of Louisiana, at Baton Rouge, which separates sulfuric acid from the alcohol-ether-water reaction mixture



$$\begin{array}{l} H\,H \\ HC\text{-}C\text{-}HSO_4 \\ H\,H \end{array} + \begin{array}{l} HOH \\ \text{Water} \end{array} = \begin{array}{l} H\,H \\ HC\text{-}C\text{-}OH \\ H\,H \\ \text{Ethyl alcohol} \end{array} + \begin{array}{l} H_2SO_4 \\ \text{Sulfuric acid} \\ \text{(regenerated)} \end{array} \quad (3)$$

Production of ether dehydrates two alcohol molecules to form:

$$\begin{array}{c} C_2H_5\text{-}O\text{-}C_2H_5 \\ \text{Diethyl ether} \end{array}$$

Theoretically the sulfuric acid can be regenerated and reused an indefinite number of times. It is understood that this is not too practicable and it must be recovered and reconcentrated before reuse. Some carbonization of the ethylene is reported in a commercial plant, the percentage yield of alcohol, however, being reportedly high.

The method outlined briefly above is only one way to make ethyl alcohol. The age-old way is by fermentation of any substance containing sugars, starches or hydrolyzable cellulose or other carbohydrate materials. Ethane gas can be chlorinated and the resulting ethyl chloride may be hydrolyzed with NaOH to form the alcohol and NaCl. Acetylene may be oxidized to acetaldehyde and this hydrogenated to the alcohol, but no commercially successful process for either of these reactions has been developed. Ethylene may also be hydrated directly in the presence of suitable catalysts to form alcohol, a general reaction which is applicable to production of many primary alcohols from the corresponding olefins.

Production of ethyl alcohol from still gases is the cheapest method known for its manufacture in large quantities. It requires about 2.5 gal. of blackstrap molasses to make 1 gal. of 95 per cent alcohol. One bushel of grain, as rye or corn, will produce about 2.5 gal. of alcohol and the cost of the molasses or the corn alone, before any processing is done, is greater than the final cost of alcohol from gases. Furthermore, instead of the long fermentation period when making alcohol by that process the reaction and purification cycle with cracked gases is a matter of a few hours at most, making for a much faster throughput and much less material held up in process than by the fermentation process.

Enumeration of the list of industrial and commercial applications of ethyl alcohol is practically impossible. Its general applications are as solvents for almost every possible type of product and reaction, and as intermediate material for the synthesis of innumerable chemicals.

As a solvent, one of the most important applications of alcohol is in making smokeless powder, using 80 per cent—160 proof—alcohol mixed with diethyl ether; alcohol alone is used in the same process to dehydrate the nitrated cotton which is the base of smokeless powder. Probably the largest outlet now is for preparation of one-third the nation's output of butadiene. Synthetic resins utilize much alcohol; the inner binding material—the "meat in the safety glass sandwich" is cellulose acetate, in which alcohol is oxidized to acetic anhydride, and combined chemically with cellulose then resinified. Dyes, tinctures, perfumes, liquid soaps, flavoring extracts, shellacs and varnish are alcohol-dissolved as well as innumerable other products.

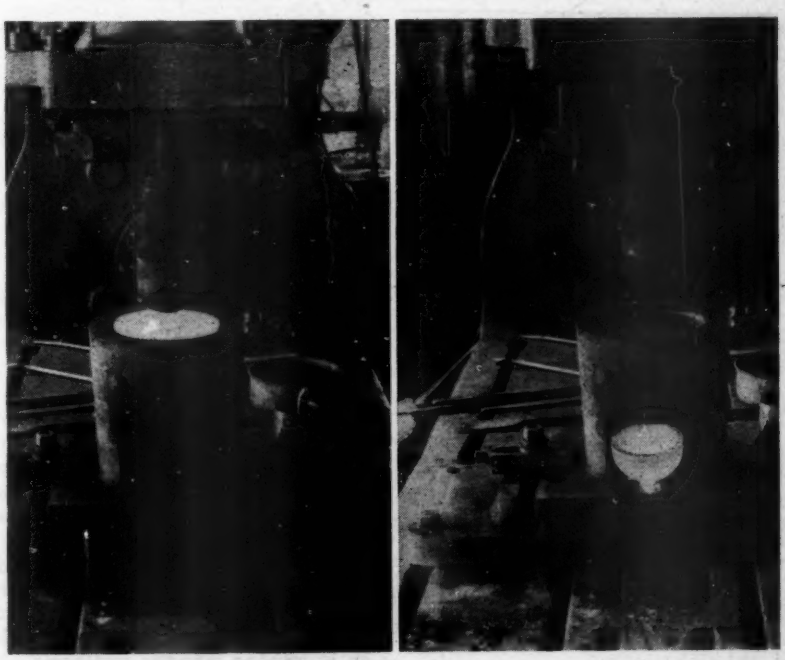
Pipe Caps Made in Refinery Shop

LARGE numbers of pipe caps are needed in a large refinery. A method of making caps from waste or spare metal sheet, as developed by Gulf Refining Co. is here described. A disk of flange steel is cut out, its diameter being determined by the diameter of the cap to be made, a regular ratio existing between the finished cap size and the disk size. A die, consisting of male and female pieces, is fitted into a 50-ton hydraulic press, the female half attached to the bed plate, the plunger attached to the shaft of the press. The disk is heated to bright red—almost white—heat and is placed over the female die, the plunger is forced down on the disk which is pressed into the shape and dimensions of the cap desired. This work can be carried on rather rapidly, it requiring some 4 hours to "flange out" 50 of the smaller-size caps—6 to 9 inches—or about 9 to 10 minutes per cap, over-all.

The rough cap is beveled for welding to the pipe or whatever its use may be. This shop is equipped to form caps of from 6-in. to 42-in. diameter, using, of course, a separate die for each size. To make a cap of 6-in. diameter requires a disk of 8¾ in. For a 20-in. cap a disk of 26 in. is used, and so on. This company uses all its sheet scrap for this purpose and any steel sheet discarded must be less than 8¾-in. diameter before being eligible for the scrap heap. These caps may be used to fabricate many special articles used in the refinery. For example, several hundred of the 6-in. caps are used to make up flowmeter pots—seal pots—used on still lines, a large number of which are used on each still unit.

The smaller dies offered no serious or insurmountable difficulties in their fabrication. The larger dies, say above 24-in. diameter, were somewhat of a problem; it was necessary to build them up by successive layers of the heaviest steel blocks.

Left: First step in making pipe caps from either new or scrap sheet. Right: Finished cap coming hot from the press, with male die raised to permit insertion of the next disk to be formed into a cap. A 6-in. cap is shown here



The Abbe Refractometer and Use Of Dispersion Measurements

by Morden G. Brown *

THE refractometer is an instrument for the convenient measurement of one of the physical properties of matter, the relative rate at which light travels in a material. The ratio of the speed of light in air to its speed in the substance under test is known as the refractive index of the substance. This index is related to the extent to which a ray of light is deflected when going from one medium to another by the mathematical expression $n_2 = n_1 \frac{\sin i}{\sin r}$ (Snell's law) where n_1 and n_2 are indices of reflection of media 1 and 2 respectively, i is the angle of incidence, and r the angle of refraction. Each angle is measured from the interface normal to the ray as indicated in Fig. 1. Since

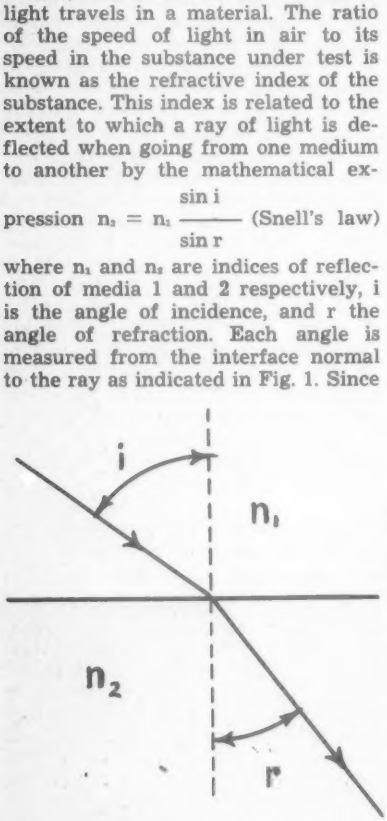


Fig. 1: Refraction of light ray

the value of n is a characteristic of each substance, its determination is often quite useful as an aid to identification of the substances. In the case of mixtures of substances, determination of refractive index is often the most convenient and one of the most accurate methods of evaluation of the proportions of the components.

The value of n for a particular substance is dependent on the wavelength of the light and upon temperature. The values of these variables to which a measurement refers are indicated by a subscript and a superscript respectively. For example, n_D^{20} would indicate that the index is measured for D light (sodium yellow lines) and 20° C. The change of index with wavelength is not uniform and not exactly described by any one or two values; hence, it is most usually recorded as the difference between values for two specific indices, usually the C and F lines of the hydrogen spectrum. For convenience in use, this difference is often associated with other values such as the difference divided by the specific gravity (specific dispersion), or the difference divided into one less than n_D (nu value). A dispersion measurement is an additional aid to identification of a material or in evaluation of the concentration of certain constituents of mixtures as will be illustrated later in this paper.

*Spencer Lens Co.

Temperature Control

The change in index with temperature is very nearly linear for a limited range such as would occur if tap water were used to control temperature. Thus, a temperature coefficient may be used for correction to a standard temperature such as 20° C. It is generally much more convenient, however, to control the temperature than to make this correction since the correction would differ with the substance under test. Temperature coefficients of refractive index seem to have had little use for analytical or descriptive purposes.

The Abbe refractometer is the most widely used type of refractometer since it is both convenient and accurate. In Fig. 2, illustrating the construction of this instrument, are shown the principal parts consisting of the illuminating prism (1), measuring prism (2), Amici prisms (3), objective (4), reticule (5), and eyepiece (6). The angle between the prisms (1 and 2) and the other optical elements (3-6) is measured by the position of a marker attached to an arm which is integral with the prisms. The scale against which this marker is read is not usually engraved in angles but in readings of n_D. For other indices than for D light, scale corrections must be made.

The function of the Amici compensating prisms (3) is to collapse the spectrum that results from dispersion of white light passed through the sample and measuring prisms to a sharp edge such as is obtained with

Refractometric measurements have become increasingly important in refining, especially as regards control of process operations. The Abbe refractometer is employed with or without Amici prisms to determine compositions of process streams, one use in particular being to find out the percentages of aromatics in streams containing both aromatics and aliphatic hydrocarbons, such as in toluene-benzene synthesis.

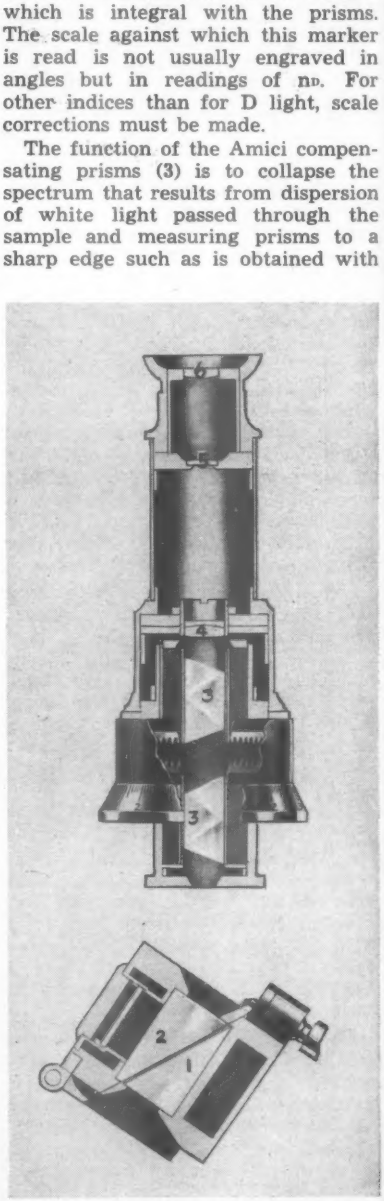


Fig. 2: Optical elements Abbe refractometer

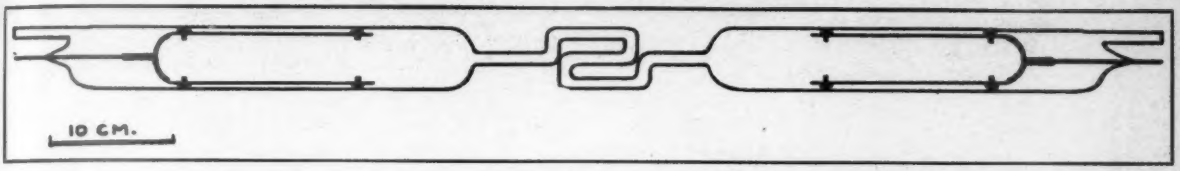


Fig. 3: Hydrogen discharge tube developed by Esso laboratories, Baton Rouge, La.

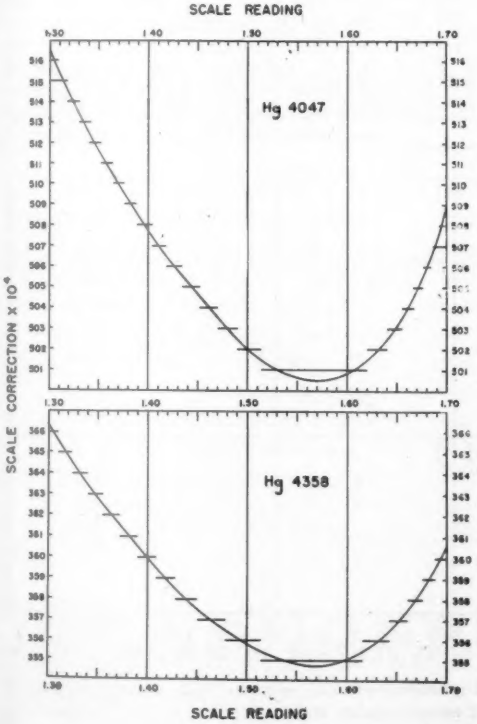
monochromatic light. The Amici prisms are designed so that the edge is at the position for sodium D light. These prisms are rotatable and the position of their rotation when the edge is sharp permits an estimate of the dispersion. Tables are required for conversion of the Amici prism reading to dispersion. A more accurate measure of dispersion can be obtained with the Abbe refractometer by other means than reading the position of the Amici prisms. In this case, the Amici prisms are set so as to cancel each other's effect on the light or an instrument without the prisms is used. The method necessitates the use of monochromatic light sources.

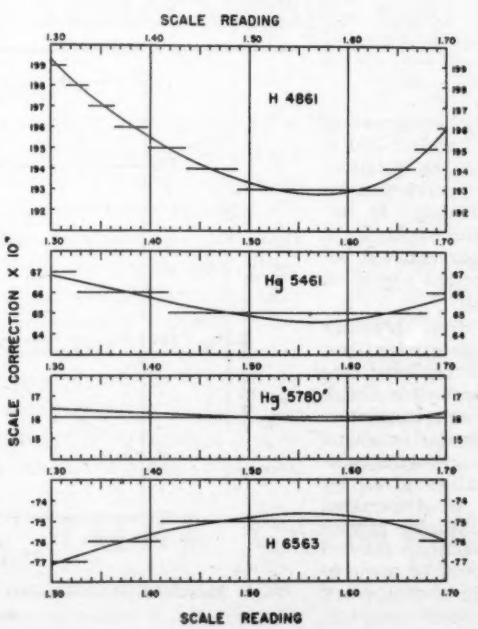
Most literature references are to dispersion of index of the hydrogen lines C (H_α) and F (H_β). These lines are very good for dispersion measurement in that they are single and widely spaced in wavelength in the visible spectrum. However, the sealed hydrogen discharge tubes[1] have a short life and hence are not very well suited to process control refractometry. Some industrial concerns (e.g. Esso Laboratories) have constructed satisfactory hydrogen discharge tubes for this purpose for their own laboratories. These tubes use a continuous flow of hydrogen in order to maintain the correct pressure of gas and purity of gas in the discharge tubes.

Construction of Tube

The Esso Laboratories, Baton Rouge, hydrogen discharge tube for refractometry is constructed of heavy walled Pyrex as indicated in Fig. 3. The correct hydrogen pressure, 2-4mm. Hg. is maintained by a continuously operating small Cenco vacuum pump and by adjustment of a control valve between the hydrogen cylinder and the tube. The vacuum may be gaged by the appearance and color (dark crimson) of the discharge. Cooling of the discharge tube is achieved through use of a water jacket through which deaerated water is flowed. The electrical equipment consists of a 10-kva., 2,300-volt transformer and 1.14 ohms added resistance. The voltage control is by means of an adjustable inductance added to the transformer primary.

Of the commercially available monochromatic sources, two are outstanding for their purity and brightness. These are the sodium[2] and mercury vapor lamps.[3] A set of filters for the principal lines from these lamps, as well as the hydrogen discharge tube, is shown in Table 1 and typical crrection graphs for an Abbe refractometer without Amici prisms are shown in Figs. 4 and 5. These correction graphs, as well as the index scales, must be individually computed for groups of instruments having identical measuring prisms. Corning Glass Works filters can be used in the molded form for refractometric work except where thickness is critical such as is the case with the blue filter No. 4303. The No. 5113 filter may be preferred in one-half standard thickness in order to increase the brightness of the Hg 4358 line. A practical pair of refractive indices for dispersion work could be obtained from the sodium lamp which is usually wanted for index reference in all cases and from the mercury lamp filtered to give only the 4358 AU light. The dispersion values would be approximately one-third greater than for C-F dispersion. This greater dispersion in itself would improve the accuracy of the method and special tables or graphs could easily be constructed for use of this or any other pair of monochromatic sources.





Figs. 4, 5: Graphs for correction of n_D scale on a particular Abbe refractometer to indices with other monochromatic light

One of the primary uses of dispersion data in process control and analysis is with reference to the quantitative determinations of aromatic hydrocarbons in gasoline and naphtha fractions from controlled distillation plants. The method is fully described by Grosse & Wackher (Ind. & Eng. Chem., Anal. Ed., 11, 614) and an extensive table there given for determination of the weight per cent aromatics from dispersion values. The method would be applicable to any other mixtures in which groups of components fell into two classes with distinctly different dispersion values. In the gasoline and naphtha fractions

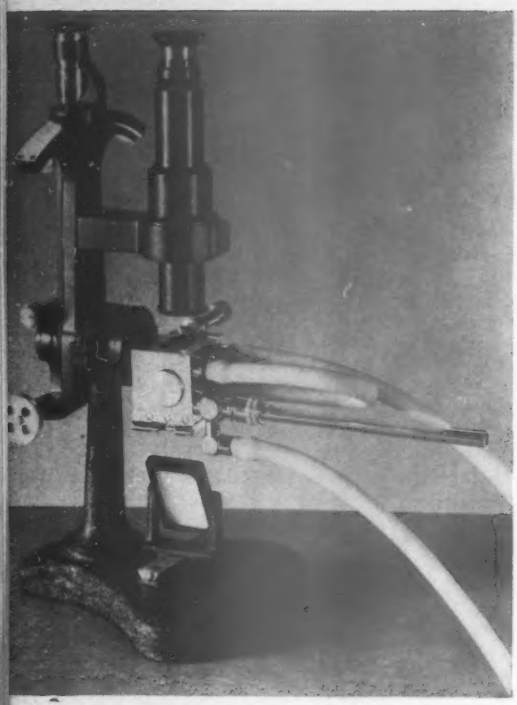


Fig. 6: An Abbe type refractometer without compensating prisms for use only with monochromatic light

the aromatics have C-F specific dispersion values of the order of 180 $\times 10^{-4}$ (Table 2) whereas the paraffins and naphthas all have values close to 99 $\times 10^{-4}$ (e.g. hexane, 98; heptane, 98; octane, 98; 2,2,4-trimethylpentane, 100; cyclohexane, 96; etc.). In this case, the weight per cent aromatics may be estimated from the specific dispersion values, δ, by the expression

$$100 \frac{\delta \text{ mix.} \times 10^4 - 0.16 \text{ Br No.} - 99}{\delta \text{ aromatics} - 99}$$

where the bromine number (grams of Br as $KBrO_3$ that will add to 100 g. of sample) enters into the relationship as a very necessary correction for the increased dispersion due to unsaturation of some of the components. If the olefins were hydrogenated before testing, this correction would, of course, not be required.

Though the Amici drum readings may be used for these determinations, the dispersion values obtained are only sufficiently accurate for rough determination of aromatic concentrations. The error is particularly marked in the low per cent aromatic mixtures as shown by values given by Grosse & Wackher. If dispersions were measured on a Pulfrich refractometer, Grosse & Wackher showed that determinations could be made to within ± 1 per cent in almost every case. This greatly increased accuracy, however, is due primarily to the use of monochromatic sources with the Pulfrich. The Abbe type refractometer itself (illustrated in Fig. 6) as shown by the data of Fig. 7, can be made to yield the more accurate results if it is used without the Amici prisms but with the monochromatic sources as outlined above.

TABLE 1

Spectrum line—	Wave length	Color	Filters for isolation CGW glass No.	Filters for isolation EKCo. gelatin No.
Hydrogen C (H_α)	6563	red	2404	29
Sodium, D	"5893"	yellow	None required	
Mercury	"5780"	yellow	3480 4303	22 64
Mercury	5461	green	3486 5120 4303	62 77 or 64
Hydrogen, F($H\beta$)	4861	blue-green	3387 5031	45
Mercury	4358	blue-violet	5113 3389	50
Mercury	4047	violet	5970 3850 4308	

Bibliography

1. Examples of this type are the Cenco No. 87235 tube or the Type 7B General Physical Laboratory tube.

TABLE 2
(From Grosse and Wackher)

Cut, °C.	Aromatics	Specific dispersion $\times 10^4$
70-100	Benzene	190
100-125	Toluene	185
125-150	Xylenes	
-	Ethylbenzene	179
150-175	C_3 and C_4	
-	Alkylbenzenes	175
175-200	C_4 and C_5	
-	Alkylbenzenes	171

2. For example, the Lab-Arc manufactured by the Nela Specialty Division of General Electric Co. and available from laboratory-supply companies.

3. Small lamps using the General Electric Co. H4 lamp, such as the Keese Engineering Co. outfit No. 160RFF-ISKH4 or one of the Conti-Glo lamps are particularly convenient.

BOOK REVIEW

CLAY COUNTY.—Geology by Harlan Richard Bergquist, Ph.D., Tests by Thomas Edwin McCutcheon, B.S., and Fossils by Virginia Harriet Kline, Ph.D. Bulletin 53, published by Missouri State Geological Survey. The addition of a Fossils part of this bulletin is a marked departure from the previous county reports except the one by Dr. Bergquist on Scott County which contains a Fossils part on the Foraminifera and Ostracoda of the Jackson formation which was enthusiastically received by professional geologists of various oil companies.

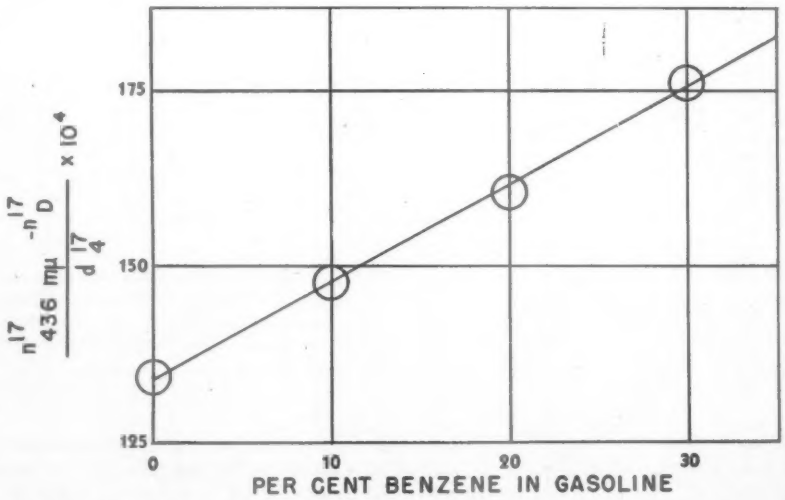
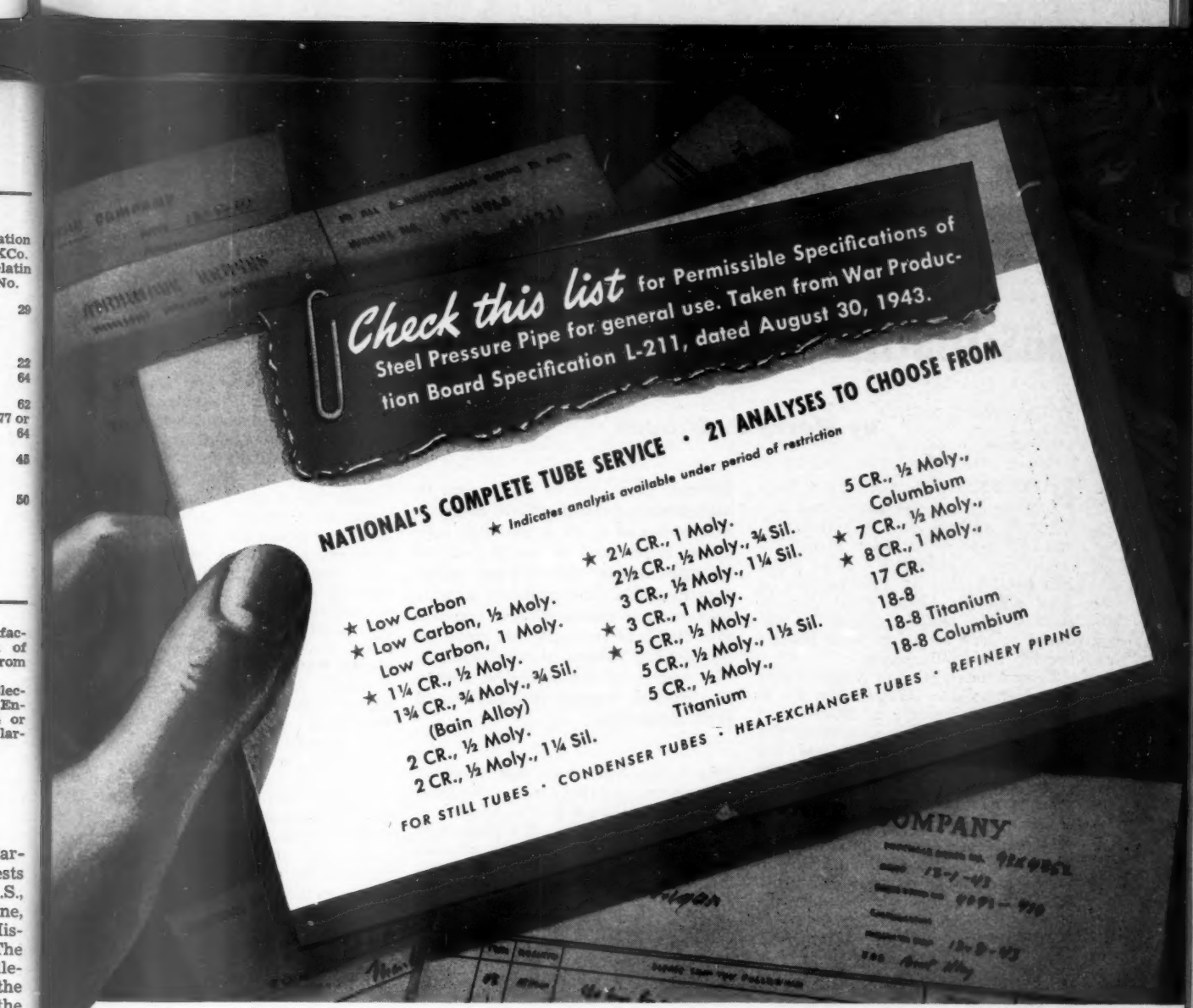


Fig. 7: Specific dispersion values for benzene-gasoline mixtures from Abbe refractometer and monochromatic lights


Check this list for Permissible Specifications of Steel Pressure Pipe for general use. Taken from War Production Board Specification L-211, dated August 30, 1943.
NATIONAL'S COMPLETE TUBE SERVICE • 21 ANALYSES TO CHOOSE FROM
★ Indicates analysis available under period of restriction
★ Low Carbon
★ Low Carbon, ½ Moly.
Low Carbon, 1 Moly.
★ 1¼ CR., ½ Moly.
1¾ CR., ¾ Moly., ¾ Sil. (Bain Alloy)
2 CR., ½ Moly.
2 CR., ½ Moly., 1¼ Sil.
★ 2¼ CR., 1 Moly.
2½ CR., ½ Moly., ¾ Sil.
3 CR., ½ Moly., 1¼ Sil.
★ 3 CR., 1 Moly.
★ 5 CR., ½ Moly.
5 CR., ½ Moly., 1½ Sil.
5 CR., ½ Moly., Titanium
5 CR., ½ Moly., Columbium
★ 7 CR., ½ Moly.,
★ 8 CR., 1 Moly.,
17 CR.
18-8
18-8 Titanium
18-8 Columbium
FOR STILL TUBES • CONDENSER TUBES • HEAT-EXCHANGER TUBES • REFINERY PIPING

How to get available seamless pipe and tubes quicker

IN spite of the fact that War Production Boards' Limitation Order L-211 to save valuable alloy elements such as chrome and nickel has been distributed for some time, frequent requests come in for alloy steel pipe and tubing that are restricted. This list will help you eliminate waste motion and expedite deliveries. Keep it handy. If you need technical help to determine which available alloy will best fit your conditions, call in the NATIONAL Tube specialist. He knows which alloys are suitable for each application.

As a matter of engineering information, we are listing NATIONAL'S "Complete Tube Service"—21 analyses of alloy steel tubes. However, the red stars designate the only ones available at the present time. When some special operating conditions are such that certain non-standard alloy tubes are required, special permission can be secured from the WPB for the use of such material.

Before you order pressure pipe or tubing for refinery use, be sure to look over this list. You can save days—possibly weeks—in unnecessary correspondence.

URGENT...MORE SCRAP NEEDED

Winter slows down the flow of scrap but the demand for steel is as great as ever. Be sure to separate your scrap into carbon steel and alloy steel.

WALLS WITHOUT WELDS

NATIONAL TUBE COMPANY

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UNITED STATES STEEL

Corrosion in High-Pressure Gas-Distillate Wells

by Harry F. Simons

Internal corrosion of equipment in high-pressure gas-distillate wells, at first believed to be a peculiar condition in isolated cases, is making its appearance on a more widespread scale. The problem now is becoming so common as to concern the distillate industry at large in developing means of combating it. The nature of the corrosion makes it a definite hazard in handling of high pressures.

NUMEROUS statements have been made by various authorities and textbook authors on the seriousness and costliness of corrosion in general but often this subject is treated much like the weather in that nothing is done about it. Under most circumstances it is either ignored or endured so long as the problem doesn't become too troublesome.

Unfortunately, the oil industry uses too much steel in its operation not to run afoul on corrosion. Much more is heard and written concerning the need of corrosion control and the methods of combating it on pipe lines and in refineries than in producing operations. Normally, the latter goes along until some very severe problem arises and then an attempt is made to prevent or circumvent the destruction of equipment by corrosion. Mainly this has been through the development of corrosion-resistant metals or by substituting noncorrosive materials where it is possible to use them.

The latest and apparently one of the most technically difficult problems in corrosion has recently arisen in the operation of high-pressure gas-distillate wells connected to recycling plants and at present a number of representatives of various companies having such plants are working on it. The first appearance of such corrosion was at Opelika, Tex.,[1,2] and it was believed to be an isolated case. Now it appears much more widespread than originally believed and that a number of fields are being bothered by a similar type of corrosion.

Hazard to Property

In addition to being a nuisance and an expense the corrosion of equipment in high-pressure distillate operations offers a definite hazard to property and personnel as a rupture in surface or subsurface equipment could easily create a condition or situation difficult to control. Pressures in such operations run from 1,500 lb. per sq. in. to as high as 5,300 lb. per sq. in.

All operators attempt to maintain a safety factor in the equipment high enough to preclude any chance of such failures. Where corrosion weakens a part of the equipment it must be replaced and this adds considerably to the cost of the operation.

The greatest danger in the corrosion being investigated at the present is its concentration in a very small area in the equipment so that the affected part is either damaged to the point where it must be replaced or it actually fails. As described in the articles cited above, the corrosion at Opelika is concentrated in the interior of the surface fittings. In another pool in Louisiana the corrosion is concentrated in the tubing either immediately below the hanger or a few joints below and four strings of tubing have been dropped from this cause to date.

The corrosion is internal but unlike another severe case of internal corrosion, that of the casing at Magnolia, Ark.,[3] there is no hydrogen sulfide in the gas or so little that it is only a trace. Being internal, the corrosion presents a serious problem in detection as many of the equipment components cannot be inspected by visual methods without killing the well. At present in one area, tubing pulled from wells is being inspected by Tuboscope to determine in what portions of its length the corrosion appears to be the most severe.

Several service cmpanies are working on instruments which will detect corrosion, or conditions produced by corrosion, with the equipment in place. By the very nature of the problem, this is difficult.

Out of 15 fields discussed at a meeting of interested parties, 7 showed some corrosion while 8 did not. The fields were in Texas, Louisiana and Arkansas. Efforts are now under way to determine in what way the conditions or the method of operation differ in the pools which do not show corrosion with the pools that do. This includes comparison of data on the producing formation, depth, reservoir pressure and temperature, well-head operating pressure and temperature, daily production rate, condensate content of the gas, sulfur content of the gas, carbon dioxide content of the gas, rate of water production, carbon dioxide content of the water, pH of the water, iron content of the water and the corrosion found to date in the various pools and the geographical and geological distribution of the wells in the pool in which corrosion has occurred.

Some interesting facts, which should cause all operators of high-pressure distillate properties to consider the problem, have been brought out to date. One is that the fields and wells may go along for a considerable period of time without showing any of the localized interior corrosion and then may suddenly develop cases. Another is that in some fields the corrosion appears to be worse in the higher than in the edge wells. In one field currently faced with a corrosion problem, wells on the edge of the field which were abandoned showed no corrosion in either the tubing or casing while wells high on the structure are now being bothered. Older wells may show corrosion where the younger wells do not but this may be partly due to a slight increase in the water content of the gas.

Causes of Corrosion

A number of underlying causes of the corrosive attacks are being considered by those interested in addition to the customary accepted conditions which lead to corrosion. In general these causes are included in the possibilities either because of the appearance of the corroded specimens, the products of corrosion, or the conditions which can exist in the wells. These include intercrystalline attack by hydrocarbons at high pressure, the carbon dioxide content of the water and gas, the concentration of the hydrogen ion in the produced water and the relationship of the latter two.

Possible cures either suggested or attempted include the partial neutralization of the produced water; inhibitors; development and use of noncorrosive steels or metals such as nickel-alloyed steel, monel metal or brass; normalized tubing and fittings; coatings of plastic material on the interior of tubing and fittings; redesign of equipment, or changes in the operation to eliminate the source of the corrosion if the critical points or conditions can be established.

The committee which is correlating data on the conditions in the various gas-distillate fields and the possible causes and cures is composed of T. S. Bacon, Lone Star Gas Co., Dallas, chairman; W. F. Rogers, Gulf Oil

Corp., Houston, and W. E. Winn, Sun Oil Co., Dallas.

Operating Problem

From an operating standpoint there are a number of things required by the presence of the localized corrosion in the distillate wells. One is the close checking of the equipment at any hint of trouble which might have corrosion as its source as well as a standardized inspection schedule. Any thread leaks on high-pressure wellhead fittings should be investigated immediately by shutting down the well and partially dismantling the christmas tree so the parts may be examined. If a gate valve fails to close properly, the cause should be investigated. Fittings which show corrosion should be replaced so that an adequate safety factor is maintained. A record should be kept of corrosion occurrence and progress in each well head.

Fittings should not be made up too tightly when assembling a christmas tree but should be made up only the proper amount. The old field expression, "As tight as possible and then a couple rounds more," may do considerable damage as it sets up strains in the metal which possibly might contribute to corrosion development at that point.

Close check of the well-head pressures should be maintained as leaks or parting of the tubing can be detected immediately by a change in the casing pressure. In wells in which there is evidence of corrosion a blind choke should not be run so that the tubing can be pulled with pressure on the well. There is danger that the tubing may collapse when the pressure is released from it and the well would then be at least partially out of control. A safer method is to kill the well.

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Deep Pennsylvania Test Drilled With Cable-Tool Rig

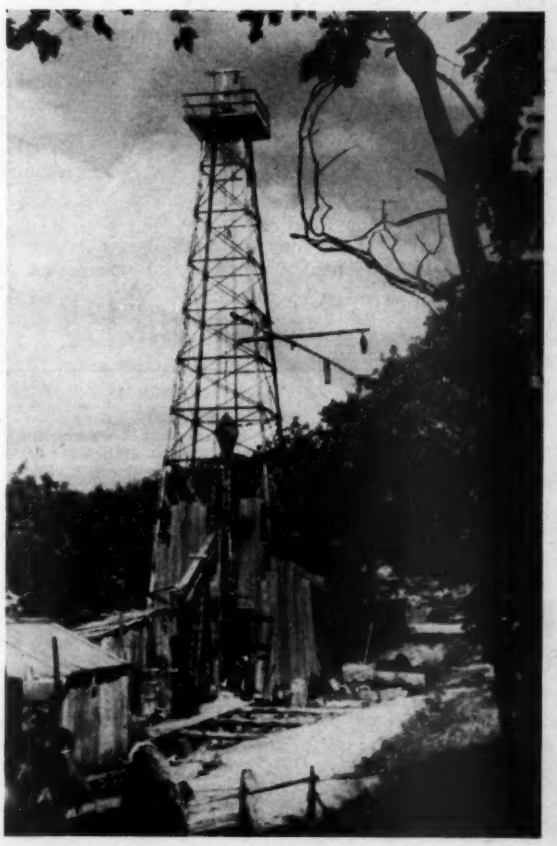
CABLE-TOOL drilling is by far the most common means used for obtaining oil and gas production in the Appalachian area of the United States. As that area is no exception to the extension of the search for petroleum to the deeper horizons, cable-tool tests often reach considerable depths. A recent test in Pennsylvania drilled with cable tools is the deepest in the state and the second deepest cable-tool hole in the world. Total depth reached was 9,024 ft., 81 ft. short of the cable-tool depth record.

Drilling Site in Rugged Country

The well was drilled by Foley & Fox, drilling contractors, Washington, Pa., for New Penn Development Corp. and William E. Snee on the Beck farm, Westmoreland County, Pennsylvania. The drilling site was on top of Laurel Ridge Mountain in a rugged country. The well was shut down for 2 months (January and February 1942) because of the weather and the difficulty of getting to the location. It was started on April 22, 1942, and was completed as a dry hole on September 30, 1943, an elapsed time of 467 days with the 2-month shutdown excluded. The casing used to protect the hole was recovered before the well was abandoned.

Objective of the well was the Oriskany sand, the deep pay which is sought generally in the area. It is a particularly good gas-producing zone. The Oriskany sand was drilled through and found unproductive.

Accompanying photographs show the rig and the crew members at the time of completion. The rig is typical of those used for drilling deep holes in the area which generally include an 84-ft. derrick with a 20-ft. base, multicylinder internal-combustion engine, 14-ft. bandwheel, steel walking beam, samson post and pitman, and 6-in. rig irons. The contractors have drilled a number of deep tests in Pennsylvania, West Virginia and Ohio.



New Penn Development Corp. and William E. Snee test on Beck farm, Westmoreland County, Pennsylvania. Casing block in derrick is same as that used for medium-depth rotary drilling

Difficult Drilling Conditions

Drilling in the Appalachian area is far from easy, as the time required to drill the Beck well indicates. The upper portion of the hole must be drilled through alternating sands and shales of Pennsylvanian and Mississippian age and then through the Devonian shales to the Onondaga lime. The Huntersville chert, just above the Oriskany sand, is quite hard and abrasive as is the Oriskany.

Because of the formational conditions, attempts to drill with rotary in the Appalachian area have been more technical than financial successes. Rotary rigs have not been able to reduce the time required to drill a hole sufficiently to compensate for their greater per-day cost of operation. A slow rate of penetration, some loss of circulation, and sticking of the drill pipe are the principal hazards.

Oil-Well Pumping Practices—No. 24

Calculation of a Unit Pumping Installation

by J. Zaba

This installment concludes the discussion of unit sucker-rod pumping installations. When the series is resumed 3 weeks hence the author will begin a discussion of multiple pumping installations.

FOR the purpose of working out an example of calculation of a unit pumping installation suppose that a pumping unit is to be installed on a well from which a maximum production of 300 bbl. of fluid a day is expected. The fluid level at this rate is around 4,500 ft. High per cent of water and very little gas is expected. No special corrosion problems will be encountered.

As mentioned in the preceding chapter of these series, in calculating a pumping installation, three sets of data are to be dealt with: (1) Given data, (2) assumed data, (3) calculated data.

Given data.—These are the data given above, that is: 4,500 ft. of lift; 300 bbl. daily production; very little gas, high-water content; no special corrosion problems.

Assumed data.—For this combination of depth and lift, plunger from 1½ to 2-in. diameter probably would be investigated. It has been decided to use speeds not in excess of 20 s.p.m. A tapered string of ¾-in. and ⅞-in. rods will be used. The pump is assumed to be at the fluid level. Calculations will be made for fluid with specific gravity of one.

Calculated data.—All calculations in this example are made with slide rule accuracy only. Plunger travel and production for calculated plunger travel are worked out first.

Rieniets' formula for plunger travel is used. This formula was discussed in Installment 9 and is given here to point out the terms which will repeat themselves in certain calculations of this example:

$$S_P = S_R \cos O \times \frac{QB}{K} - \frac{2W_f}{K} - \frac{F}{K}$$

where

S_P = plunger travel

S_R = polished-rod stroke

O = phase angle, to be obtained from Fig. 1, Installment 9—damping factor 0.8 has been assumed—period ratio T_1/T_2, and what follows expression cos O will be the same for the same speeds of operation for different plungers and length of stroke.

Q = the disturbing force = weight of fluid (1 + acceleration factor) + 2 × weight of rods × acceleration factor. Weight of rods and fluid will be, in this case, the same for given plunger for different speeds and lengths of stroke—acceleration factor, which can be calculated or read from Table 3, Installment 8, will be the same for given combinations of speed and stroke.

B = magnification factor—to be read from Fig. 2, Installment 9—it will be the same for given speeds for different plungers and length of stroke.

K = spring constant of rods. With pumping depth constant this factor will be constant for given combination of the tapered string.

W_f = weight of fluid, already discussed.

F = rod friction load, not considered in these calculations.

One and one-half-inch plunger.—As stated above, certain values will be constant, regardless of length of stroke and speed.

From Table 4, Installment 8, manufacturer's recommendation for tapered string of ¾-in. and ⅞-in. rods for 1½-in. plunger is: 29.1 per cent of the string to be ⅞-in. rods. Therefore:

4,500 × 0.291 = 1,310 ft. of ⅞-in. rods
4,500 × 0.709 = 3,190 ft. of ¾-in. rods

Wt. of rods — 1,310 × 2.25 = 2,960 lb.
3,190 × 1.62 = 5,190 lb.
8,140 lb.

Area of plunger = 1.770 sq. in.
Area of rods = 0.442 sq. in.
Net area of plunger = 1.328 sq. in.
Weight of fluid = 1.328 × 4,500 × 0.43 = 2,560 lb.

Area of ¾-in. rods is used in calculating net plunger area.

With these constants available length of plunger travel is now calculated for 1½-in. plunger for different speeds and lengths of stroke. With the desired production of 300 bbl. and with speed not to exceed 20 s.p.m. two lengths of stroke, the 54-in. and the 60-in. will be investigated.

1½-in. plunger — 54-in. stroke — 10 s.p.m.:

$$T = \frac{4 \times 4{,}500}{17{,}000} = 1.06$$

$$T_2 = \frac{60}{10} = 6$$

$$\frac{T_1}{T_2} = \frac{1.06}{6} = 0.18$$

TABLE 1

Plunger size (in.)	Stroke (in.)	S.p.m. for 300 bbl. per day production
1¾	54	19
1¾	60	17.5
2	54	17
2	60	15.5

TABLE 2

Plunger size (in.)—	S.p.m	54-in. stroke: Plunger travel (in.)	54-in. stroke: Production (bbl. per day)	60-in. stroke: Plunger travel (in.)	60-in. stroke: Production (bbl. per day)
1½	10	49.4	91	55.9	103
	15	57.3	159	64.4	177
	20	69.3	255	76.3	280
1¾	10	44.9	112	51.7	129
	15	54.5	203	61.4	228
	20	65.7	329	74.6	372
2	10	40.5	133	46.9	154
	15	50.4	246	57.2	279
	20	63.5	415	72.1	470

TABLE 3

Plunger size (in.)—	Stroke (in.)	S.p.m.	Peak polished-rod load (lb.)	Peak torque (lb.)
1¾	54	19	14,300	163,400
1¾	60	17.5	14,390	185,400
2	54	17	15,800	202,200
2	60	15.5	15,850	226,000

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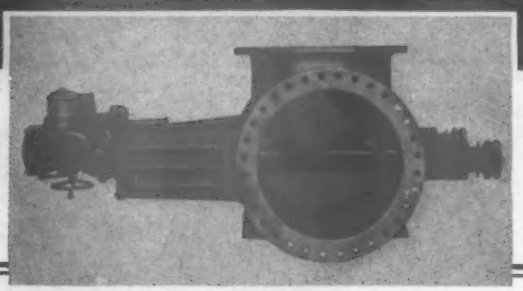

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From Fig. 1, Installment 9 for assumed r = 0.8:

$$O = 8°$$

$$\cos O = 0.99$$

$$C = \frac{\left(\frac{10 \times 2\pi}{60}\right)^2 \times 27}{386} = 0.077$$

$$Q = 2{,}560\,(1 + 0.077) + 2 \times 8{,}140 \times 0.077 = 4{,}035$$

$$K = \frac{30{,}000{,}000}{\frac{1{,}310 \times 12}{0.601} \quad \frac{3{,}190 \times 12}{0.442}} = 268$$

From Fig. 2, Installment 9 for assumed r = 0.8:

$$B = 1.0$$

With the component terms of the formula calculated, the plunger travel can now be determined:

$$S_r = 54 \times 0.99 + \frac{4{,}035 \times 1.0}{268} - \frac{2 \times 2{,}560}{268} = 49.4 \text{ in.}$$

To figure displacement for this plunger travel, formula for displacement in Installment 11 is used. Volumetric efficiency of 70 per cent is assumed.

Production = 49.4 × 10 × 0.262 × 0.7 = 91 bbl. per day. It is apparent that this combination of length of stroke and speed with 1½-in. plunger is not sufficient to furnish the desired production.

Similar calculations are carried through for 1½-in. plunger and 54-in. stroke for speeds of 15 and 20 s.p.m. Then for 1½-in. plunger and 60-in. stroke for speeds of 10, 15 and 20 s.p.m. Finally all these calculations are repeated for 1¾-in. and 2-in. plunger. Results of these calculations are shown in Table 1.

To better visualize the relation between production and different combinations of plunger, speed of operation and length of stroke Figs. 1 and 2 are prepared. It can be seen from these charts that, within assumptions of this example, the 1½-in. plunger will not furnish the desired production of 300 bbl. per day either for 54-in. or 60-in. stroke. The other plungers will pump 300 bbl. per day at speeds and strokes shown in Table 2.

For the above combinations peak loads and peak torques are now calculated. For determining the peak polished-rod loads the A.P.I. formula is used (Installment 7). In determining the peak torque it is assumed that only the weight of rods is counterbalanced.

1¾-in. plunger — 54-in. stroke — 19 s.p.m.:

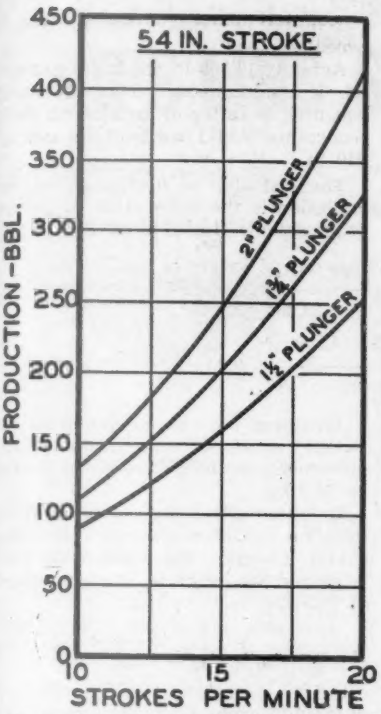


Fig. 1—Production for 4500-ft. lift, tapered string of 7/8-in. and 3/4-in. rods, 70 per cent volumetric efficiency for 54-in. stroke

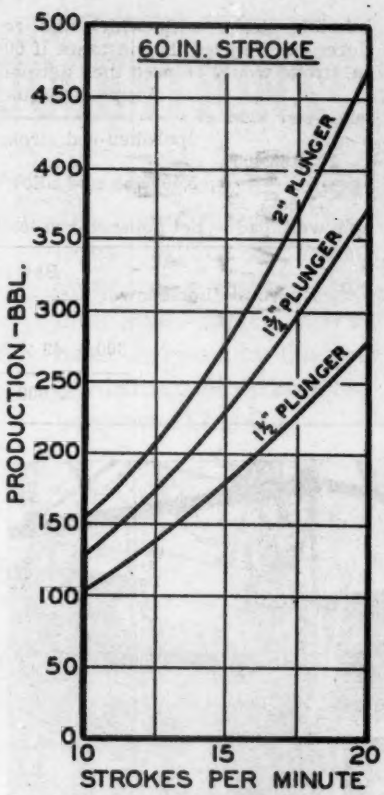


Fig. 2—Production for 4500-ft. lift, tapered string of 7/8-in. and 3/4-in. rods, 70 per cent volumetric efficiency for 60-in. stroke

Peak polished-rod load = (weight of rods + weight of fluid)

$$\left(1 \times \frac{\text{Stroke} \times \text{S.p.m.}}{5{,}400}\right) = (8{,}210 + 3{,}800)$$

$$\left(1 \times \frac{54 \times 19}{5{,}400}\right) = 14{,}300 \text{ lb.}$$

Peak torque = (peak polished-rod load counterbalance) stroke/2 = (14,300 — 8,210) 54/2 = 163,430 in.-lb.

Repeating these calculations for the other three combinations results shown in Table 3 are obtained.

The table brings out the relation between plunger size, length of stroke and speed of operation on one side and the corresponding loads and torques on the other side for the 300 bbl. per day production. It is apparent that the 1¾-in. plunger, 54-in. stroke and 19 s.p.m. combination results in most satisfactory load and torque. While the question of this speed of operation may be debatable, the combination is selected for the purpose of the example.

For this combination the constants are as follows:

1¾-in. plunger — 54-in. stroke — 19 s.p.m.

Rods:

4,500 × 0.33 = 1,485 ft. of ⅞-in. rods
3,015 ft. of ¾-in. rods

Weight of rods:

1,485 × 2.25 = 3,330 lb.
3,015 × 1.62 = 4,880 lb.
8,210 lb.

Area of plunger = 2.41 sq. in.
Area of ¾-in. rods = 0.442 sq. in.
Net area of plunger = 1.968 sq. in.
Weight of fluid = 1.968 × 4,500 × 0.43 = 3,800 lb.

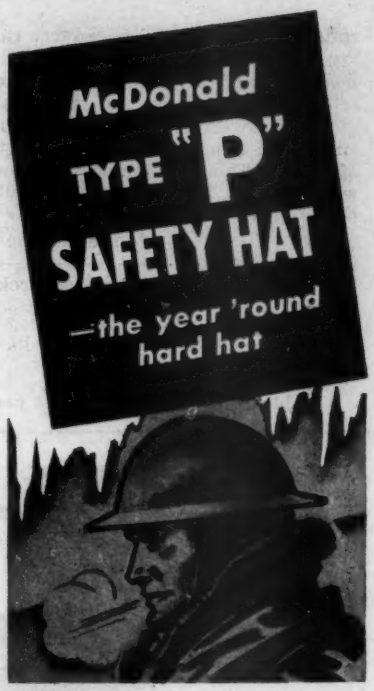
To use the loads for check on the originally selected tapered string of rods, the unit stress for the top rod of the ¾-in. rod string would be (Installment 8):

$$\frac{(\text{Weight of fluid} + \text{weight of } \tfrac{3}{4}\text{-in. rods}) \times \text{acceleration factor}}{\text{area of } \tfrac{3}{4}\text{-in. rods}}$$

$$= \frac{(3{,}800 + 4{,}880) \times 1.27}{0.442} = 25{,}000 \text{ lb. per sq. in.}$$

With the assumption of no special corrosion problems and using data in Table 1, Installment 8, S.A.E. 1335 (approximately 1.75 per cent manganese) rods could be used.

For the selected combination of plunger, speed and stroke the calculated rating of the surface equipment is 14,300 lb. pumping structure



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rating and 163,400 in.-lb. reducer rating. It has been pointed out (Installments 16 and 21) that reducer once selected determines the allowable minimum well load on the downstroke and also the permissible length of stroke. The permissible minimum well load on the downstroke would be:

$$\text{Counterbalance} - \frac{2 \times \text{peak torque}}{\text{polished-rod stroke}}$$

$$= 8{,}210 - \frac{2 \times 163{,}000}{54} = 2{,}170 \text{ lb.}$$

The 54-in. stroke is the longest permissible stroke with which the reducer can be used. For instance if 60-in. stroke would be used then net polished-rod load $= \frac{2 \times \text{peak torque}}{\text{polished-rod stroke}}$

$= \frac{2 \times 163{,}400}{60} = 5{,}400$ lb., and allowable well load = net polished-rod load + counterbalance = 5,450 + 8,210 = 13,660 lb.

Actually 14,300-lb. loads are expected. If the pumping structure rating was used as rating of installation their occurrence would overload the unit by 640 lb.

The last step in design of the installation is the calculation of power requirements (Installment 17).

$$\text{Hydraulic horsepower} = \frac{\text{Bbl. fluid per day} \times \text{weight of fluid} \times \text{lift}}{33{,}000 \times 1{,}440}$$

$$= \frac{300 \times 42 \times 8.33 \times 4{,}500}{33{,}000 \times 1{,}440} = 9.95$$

Assuming the over-all pumping efficiency as 40 per cent the power requirements at the prime mover would be 24.9 hp.

To summarize, the installation in question would consist of following: 1¾-in. plunger, operating with polished-rod stroke of 54 in. with speed of 19 s.p.m.

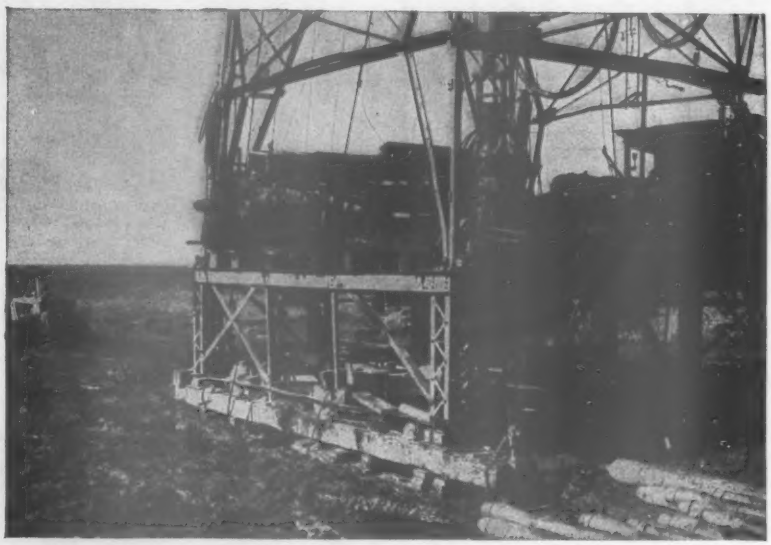
Tapered string of S.A.E. 1335 rods consisting of 1,485 ft. of ⅞-in. rods and 3,015 ft. of ¾-in. rods.

Surface equipment with structure pumping rating of not less than 14,300 lb. and torque rating of not less than 163,400 in.-lb. at 19 s.p.m. The maximum permissible stroke would be 54 in. and the minimum allowable load on the downstroke 2,170 lb.

Prime mover of 25 hp. oil-field service rating.

It is not necessary to point out that depending on the opinion of the purchaser, reflected in the assumed data, as to the proper balance between safety, efficiency and economy considerable variations in the results of above calculations could be attained.

The above example concludes the discussion of the unit sucker-rod pumping installation. The discussion of multiple pumping installations, will start in the next installment of this series.



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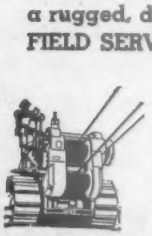

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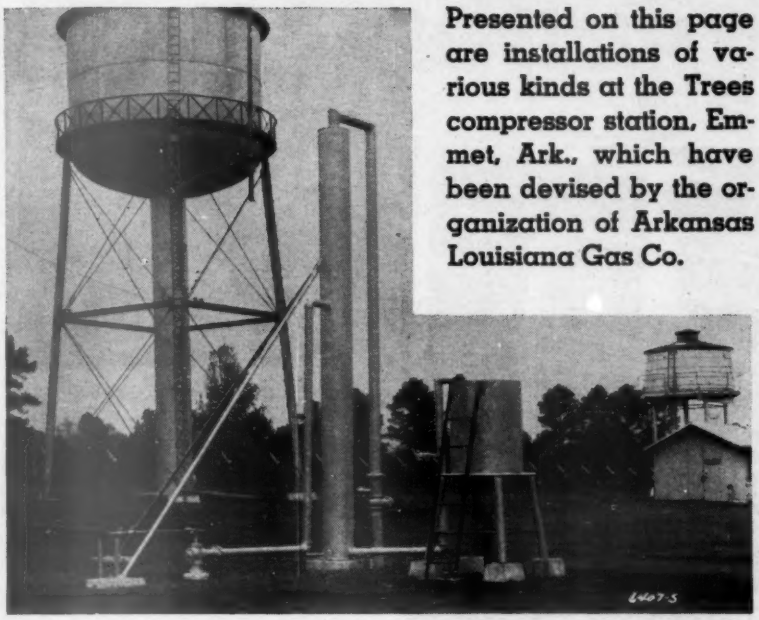
BOOK REVIEW

PETROLEUM INDUSTRY TAX AND COURT SERVICE. Edited by Leo C. Haynes.

This monthly bulletin is devoted to the specific interests of the petroleum industry. It analyzes the mass of tax materials and court reports available and presents in concise form the applicable points from Treasury, Tax Court and other decision; Treasury and Commissioner's rulings, and federal and state court decisions on matters affecting or of special interest to the oil industry, with particular emphasis on federal income and excess profits taxes. Mr. Haynes is associate professor of accounting at University of Texas. Address Box 1024, Austin 6, Tex. $10 per year.

PIPE-LINE SUGGESTIONS



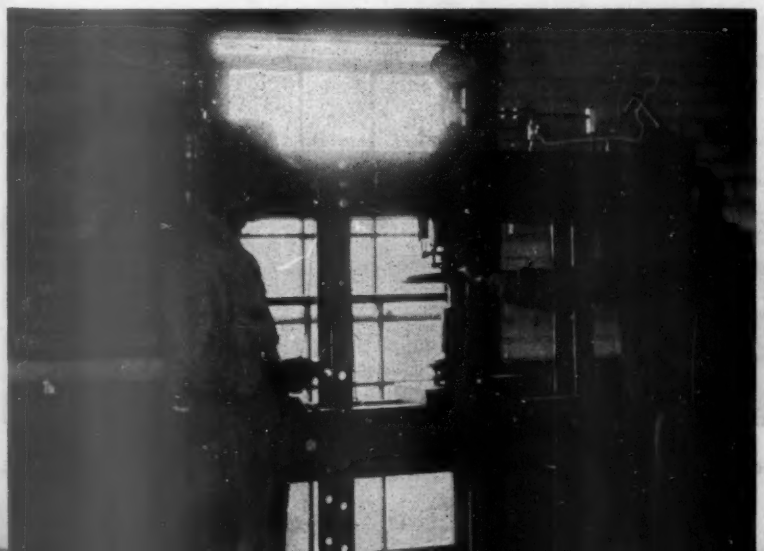
Presented on this page are installations of various kinds at the Trees compressor station, Emmet, Ark., which have been devised by the organization of Arkansas Louisiana Gas Co.

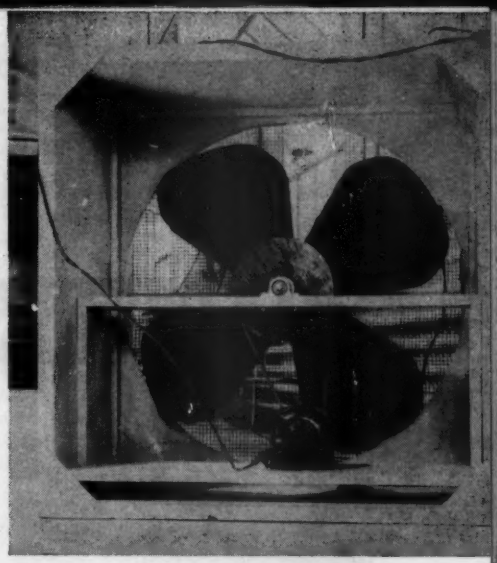
Supplying Water to Compressor Station

THE water supplied to the station is flowed by gas from wells located in the station yard. At each well there is a standpipe which serves as a separator and a small tank mounted on a short derrick which receives water from the standpipe. From these tanks, water flows by gravity to lines leading to a pump suction pit from which it is pumped by motor-driven centrifugal pumps to a large water tower supplying the plant and the community of employes' houses. After separation, the gas is returned to the compressor engines for fuel.

Hydraulic Press for Station Maintenance

TO facilitate overhauling operations, the company built 40-ton hydraulic presses in its main machine shop at Sterlington, La. These have been distributed so that one is installed at each of the large compressor stations where it can be used to advantage. These presses have proved to be particularly valuable in removing worn valve bushings and replacing new ones, bending pipe, holding large pipe for threading and various other jobs.



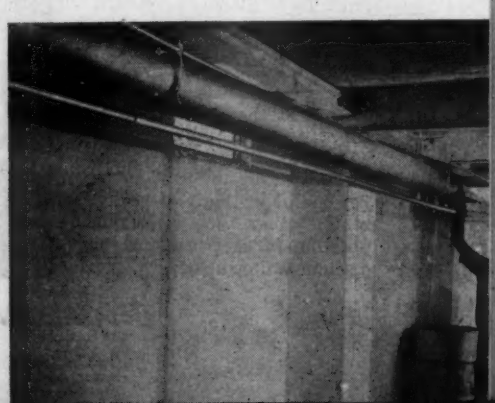


Fan for Compressor Station

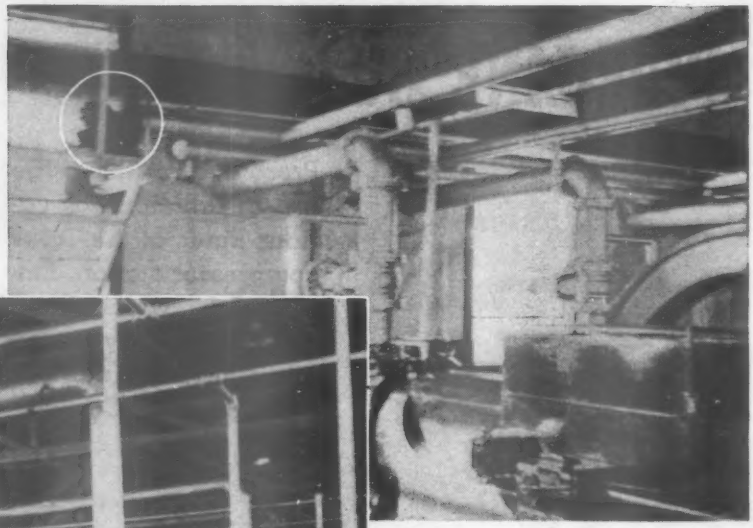
IN order to improve working conditions and add to the efficiency of employes engaged in making major repairs to these large compressor units during the hot summer months, the company has had large electric-driven fans built at its main machine shop at Sterlington, La., for each of its main-line stations. These fans are driven by explosion-proof motors, are durable, economically built, and can be easily moved from one part of the station to another.

Pressure Tank for Lube Oil

AT the Trees compressor station, a vertical lubricating-oil tank made from a 16-ft. joint of 18-in. pipe and hung from a column at the gable end of the building, serves as pressure storage tank. The bottom of this tank has a conical head with a 2-in. connection for drawing off water and sludge that accumulates in the oil. The supply lines to the engines being located 2 ft. from the bottom of tank and the return line from the filter at the top of the tank. A coil consisting of approximately 60 ft. of 1½-in. pipe is placed inside the tank to serve the dual purpose of cooling the oil in summer and heating it to normal temperature in winter. Cooling is effected by water from a deep well connected to coil and steam serves to heat the oil in winter. To further facilitate cooling or heating the lubricating oil a heat exchanger was installed in the basement of the station.



PLANT PRACTICES



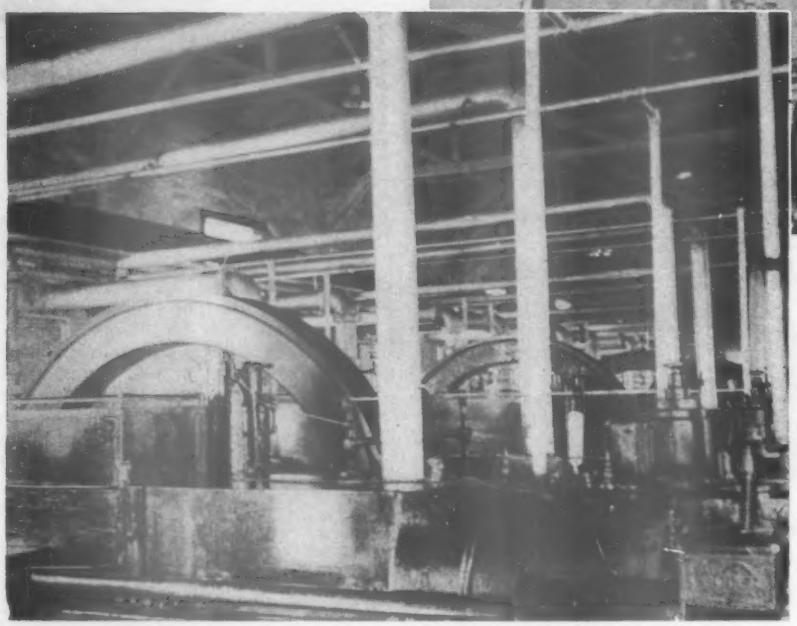


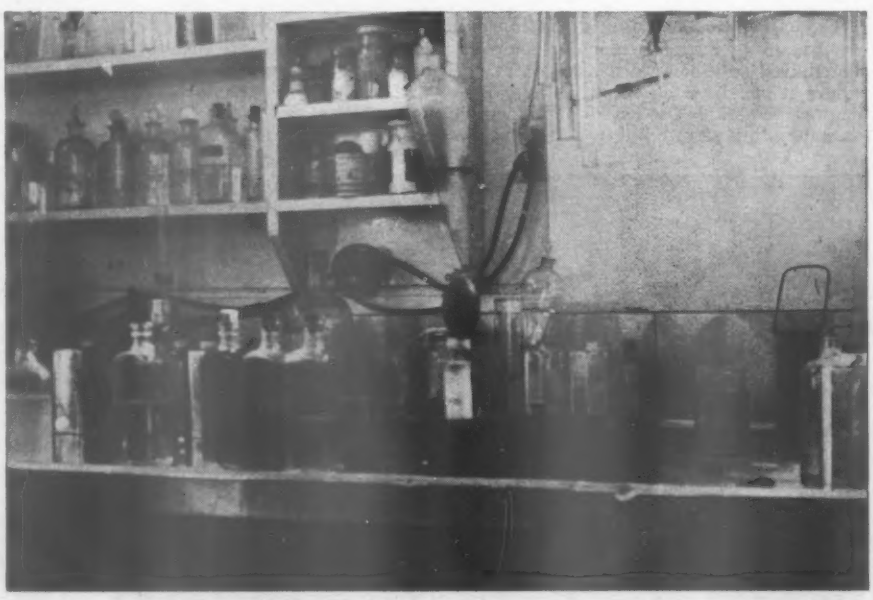
Fig. 1 (left) *Fig. 2 (above)*

Vent System for Hot Oil Vapors

IN the operation of horizontal, reciprocating-type engines driving compressors or pumps, there usually is slight seepage of hot lubricating oil or condensate through the packing of the cylinder stuffing boxes around the pistons. This hot oil in contact with the outside air forms a vapor which not only fogs the engine room but in condensing, collects on equipment and interior walls of the building collecting grime and dirt. This situation is eliminated in a large compressor plant in the Rocky Mountain district by a vapor-removal system. The piston of each engine-compressor unit is covered with a hood, fabricated from light-weight sheet metal, which fits snugly over the stuffing boxes at each end. Vent lines, consisting of ordinary stovepipe, lead overhead from the tops of the hoods (Fig. 1) to a common outlet line which extends along one side the length of the interior of the compressor building. A small motor-driven suction fan at the outlet end of the common vent line (Fig. 2) pulls the vapors from the various hoods through the vent system and passes them out of the building.

Sulfur Container in Plant Laboratory

THE addition of the required amount of sulfur to the 4-oz. bottle when making a doctor test on gasoline is simplified and the reserve supply is kept free of atmospheric contamination with a simple apparatus made by a "boll-weevil" laboratory attendant. Two glass tubes are passed through a common laboratory cork which fits snugly into a small straight beaker or test tube. The end of one of the tubes is bent slightly, while the opposite end enters well down into the sulfur in the test tube. An atomizer bulb attached to the other tube makes it possible for air pressure to discharge the sulfur.



Front Lines in

REFINING

by Arch L. Foster

More Stringent Patent Requirements?

TWO possible interpretations of a recent decision of the U. S. Court of Appeals in the District of Columbia in rejecting a Sinclair Refining Co. application for a patent on the Smith process may be made. One and the more expectable interpretation is that this is a routine rejection of an application which was not found to be patentable, not an invention, as has been the case with innumerable thousands of applications in the history of the Patent Office. The other is that this represents a tightening up of the requirements for patentability toward which the trend in government circles seems to be setting.

The application covers a process for cracking petroleum which is built around the principles of very rapid heating of the charge. The Sinclair company appealed from the rejection by the Patent Office itself. The application claimed the practical elimination of coke and tarry residues. The court claimed that the industry was well acquainted with the use and usefulness of the rapid-heating principle before Smith applied it to cracking, and that the results obtained in the Smith process are the natural development of the art without any special inventive concept being involved.

What this may mean in the patent field is conjectural until more Patent Office history is made. Recently a Patent Planning Commission was appointed, with its chairman Charles F. Kettering, research head for General Motors Corp., and Conway P. Coe, patent commissioner, as its secretary. Its purpose as outlined by the president is a careful study of our patent system and recommendations as to its revision and improvement, the elimination of bad practices and abuses of the present system. One far-reaching report has been made which was reported and discussed at length in the pages of The Journal recently (August 12, 1943, page 43). The principles of reform outlined in this initial report appear to fit the ideas of the average qualified technologist and patent attorneys in general so far as they have been questioned regarding the proposed moves. It is possible that the Patent Office may be putting into effect some of these proposed revisions, already; however, one instance of a patent application rejection certainly does not prove or disprove this.

New Bases for Lubricating Greases

LUBRICATING greases are in great measure anomalous products in the petroleum industry. Necessity for maintaining liquid lubricating media in locations where no retaining walls are possible, usually requires use of one or more metallic soaps or salts of fatty acids. In this matrix liquid lubricating oil is trapped by mixing the two, solid and liquid. This mechanical mixture is known in the industry as lubricating grease. Many metallic salts of oleic, palmitic, stearic and other fatty acids, with sodium, potassium, calcium and other metal ions have been employed for this purpose.

More recently soaps of lithium, lowest molecular-weight member of the alkali metal series, have been used with considerable advantage. Also, strontium salts (soaps) are being studied to determine what properties of greases may be improved by its use. Some technologists feel that eventually a small number of lithium greases will replace a much larger number of greases made from different soaps. This is believed likely because of the remarkable properties of the lithium product, especially the small change of the properties of the grease with temperature changes.

Lithium soaps are reported to have improving effects on melting points, tensile strength and crystal structures of petroleum (paraffin) waxes. W. F. Luckenbach of Foote Mineral Co. reported to the National Lubricating Grease Institute in Chicago recently that lithium compounds have beneficial results when used as grease antioxidants, in wetting agents and as detergent aids in lubricating oils. Strontium soaps are being studied in greases, as detergents and as additives for waxes, and also as oxidation inhibitors.

Fortunately for this developing field, ore deposits as sources of lithium are large. The largest are in the Black Hills region, South Dakota, the next largest in the King's Mountain section of North Carolina. Strontium occurs as celestite in Mexico, Texas and California in large deposits.

Make Alcohol From Gases

INDUSTRIAL alcohol for all purposes including butadiene-from-alcohol plants will consume about 275 million gallons during 1943; Walt Whitman, WPB chemicals branch head, says in 1944 we'll use 640 million gallons. Our alcohol reserve on July 30 was 150 million gallons; on January 1, 1944, it will be around 90 million gallons, reduced to 40 million by January 1, 1945. At this rate the stockpile at the beginning of 1945 will be only big enough for 3 weeks' supply. All beverage alcohol is being concentrated for industrial purposes.

A great furor is on for increasing the imports of blackstrap and high-test molasses from Cuba. WPB plans to ferment a million tons of this year's Cuban sugar in the form of molasses to yield additional alcohol. All the available blackstrap from the various Caribbean countries is to be brought to this country for fermentation. Yet officials hardly hope that all these emergency measures can supply us with enough alcohol to build up a suitable stockpile as guarantee against stoppages due to accidents, repair shutdowns, sabotage, slow delivery of new equipment.

Now, ethyl alcohol can be made from hydrocarbon gases, in greater purity, with the same equipment, than can possibly be produced from grains, sugar, starches, etc. The processes are available and thoroughly proved in peacetime, economic competitive industry. At least three companies are understood to be making ethyl alcohol from hydrocarbon gases right now. In refineries and in natural-gasoline plants huge quantities of ethane and propane are available and unused except as still fuel, ready to hand for cracking to ethylene; this olefin is esterified to form ethyl sulfate, with sulfuric acid, and hydrolyzed to ethyl alcohol. Cracking plants are available; acid is available. It is most likely that less time is needed to start production this way than any other.

Why not alcohol from petroleum gases?

Loss of Circulation Creates Hazards In Drilling Deep Florida Well

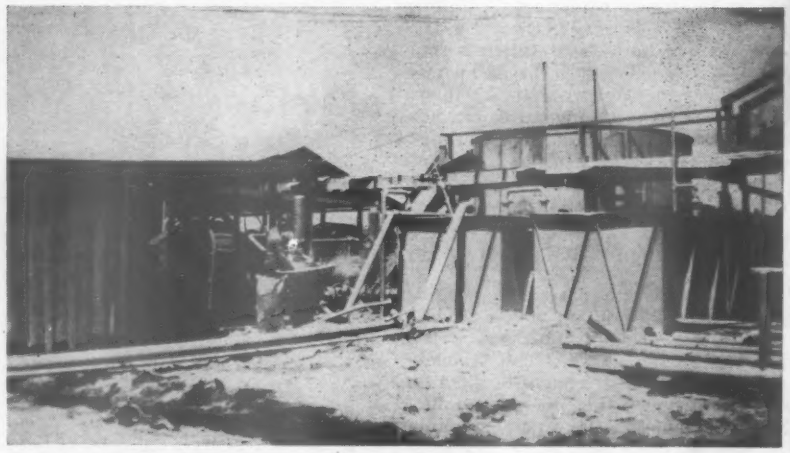
Coral beds and other porous formations in Humble Oil & Refining Co. Everglades test necessitated unusual operating procedure. One continuous interval of more than 4,000 ft. was negotiated without returns. Project was complicated by heavy water flows which had to be controlled. Cementing of casing strings presented difficulties.

by E. H. Short, Jr.

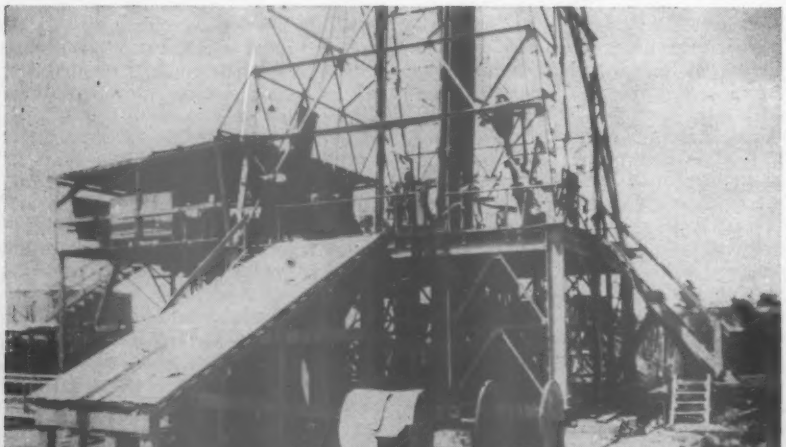
DRILLING by Humble Oil & Refining Co. of its recently completed deep well in the Everglades district of Florida was not without its unusual difficulties and hazards. Chief of these were occasioned by the necessity of having to negotiate thick sections of coral beds and other porous and broken formations which resulted in loss of mud circulation and a constant threat of stuck drill pipe and fishing jobs. One continuous interval totaling 4,023 ft., or 35 per cent of the total hole, was drilled with complete loss of returns. This was complicated by having to control heavy water flows.

The well, 1 Gulf Coast Realties Corp., located near Sunniland, Collier County, was drilled to a total depth of 11,626 ft., where with 7-in. casing set and cemented at 11,597 ft., it was completed as the state's first oil producer. Completion was by pumping, and the well is making considerable water. A 30-day test now is under way to determine its commercial importance.

Trouble began almost immediately after drilling out below the 20-in. conductor pipe which had been set at 106 ft. and cemented to the top without difficulty. In a loose, porous water sand penetrated from 150 to 300 ft., it was necessary to use considerable quantities of viscous artificial



Mud-storage shed, mud hopper, steel pits and reserve mud tanks



View of derrick and 15-ft. substructure

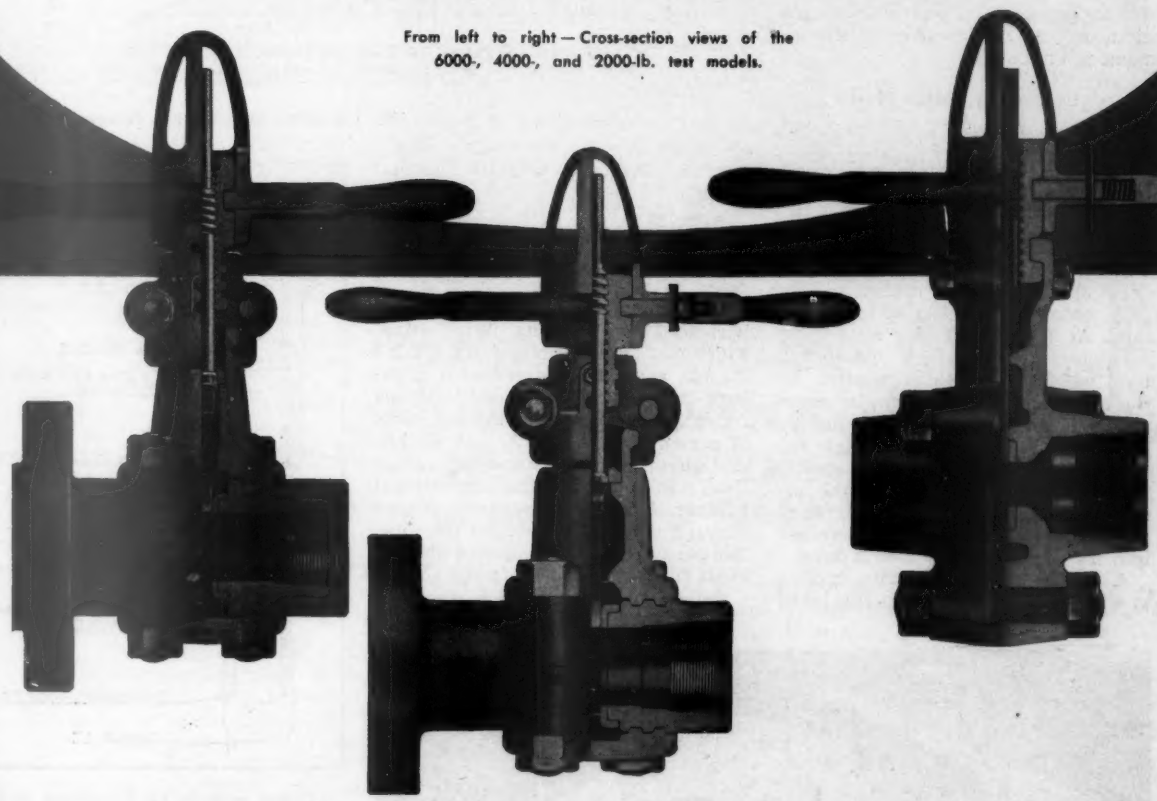
View of board road connecting the test to the state highway

CAMERON

Flex-Seal

MUD LINE VALVES

From left to right — Cross-section views of the 6000-, 4000-, and 2000-lb. test models.



When subjected to the abrasive action of drilling fluid, conventional valves, employing a metal-to-metal seal, often quickly cut out and lose their seal. As a rule, costly repairs are required to restore them to their former usefulness.

Not so with Cameron "Flex-Seal" Mud Valves whose renewable resilient flow-way insert absorbs the abrasive and erosive action of the fluid and continues to provide a pressure-tight seal until the reserve of resilient material is depleted. When finally worn out, the flow-way insert (which costs only a few dollars) can be quickly and easily replaced in the field with ordinary rig tools by any member of the drilling crew. Renewable steel wear rings protect the hub ends against cutting. The slow-wearing heat-treated steel gate seldom needs replacement because the resilient insert readily flows to a seal around the gate even when it is substantially sand cut.

Cameron "Flex-Seals" are the only valves designed expressly for mud line service. Operator's records reveal that they last five times longer and require only one-third the maintenance of conventional mud valves and stop cocks. Try them on your rig for a first-hand check on their economy and operating features.

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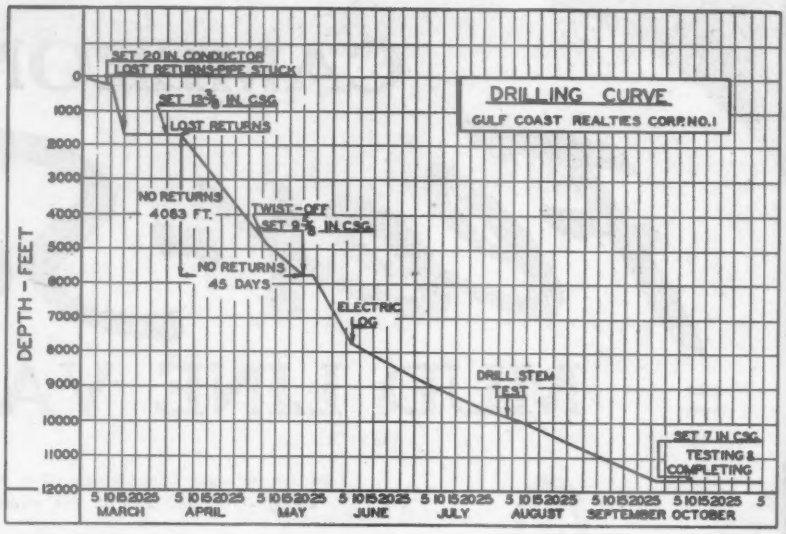
mud to maintain circulation. Then, while drilling at 1,673 ft., the hole again started taking mud. Before circulation could be established the 4½-in. drill pipe stuck. Efforts to free the pipe by washing over it failed, and it was necessary to cut it out with an inside cutting tool run in on a string of 1⅜-in. drill pipe.

Hole was cleaned successfully, but to avoid further trouble in deeper drilling it was decided to run a protection string of surface casing. Down to this point 12½-in. hole had been drilled, and to run 13⅜-in. casing, which was desired to prevent reducing hole size too greatly, the hole was reamed to 17½ in. The casing was landed at 1,644 ft. Efforts were made to cement the string to the top but 750 sacks were pumped without getting returns and the top of the cement is unknown.

Control of Water Flow

Immediately after drilling plug, the hole at a depth of 1,704 ft. again started losing circulation. After pumping more than 1,800 bbl. of artificial mud and more than 6,000 lb. of citrus pulp in an unsuccessful attempt to seal the formation, it was decided to drill ahead without returns, using only water to save loss of expensive mud. At 2,600 ft. a heavy water flow was encountered, which required a mud weight of 9.4 lb. to control. As the mud column in the annular space above the water flow could not be built up by circulation through the drill pipe, the mud-weighting admixtures had to be pumped into the annular space. Continuing drilling, from 50 to 100 bbl. of mud was pumped into the annulus every 2 to 3 days.

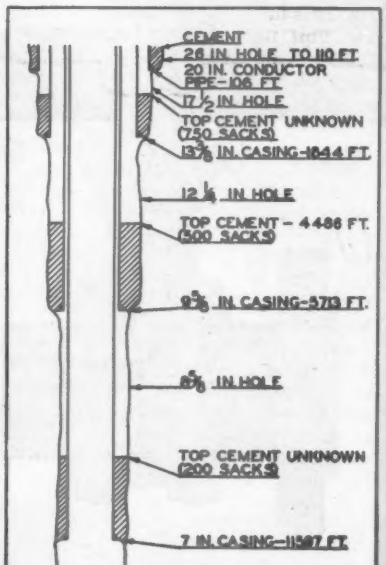
A twistoff occurred while drilling at 4,787 ft. but the fish was recovered in this instance without unusual trouble.



Curve of drilling time for Humble Oil & Refining Co.'s Florida Everglades well

At 5,727 ft. the hole seemed to be through the coral beds, going into lime and anhydrite, and it was decided to run a protection string of 9⅝-in. casing. No difficulty was experienced in running this string, which was landed successfully at 5,713 ft., but cementing presented a problem, in view of the highly porous formations. Approximately 500 sacks of cement were used. A part of this, enough to cement around the casing shoe, was pumped in the conventional manner. The remainder was placed through the annulus behind the pipe. Temperature surveys showed the cement filled up to 4,486 ft.

Below the 9⅝-in. casing, the principal problem was to maintain a low water loss mud and reduce the filtration rate. Most of the formations from there to bottom consisted of lime and anhydrite, which tended to flocculate inorganic colloids in the mud and increase the filtration rate. The problem, however, was overcome to a large extent by the use of organic colloids, consisting of starch admixtures, which reduced the water loss to between 4 and 6 cc. Before the starch was used, the water loss was so great that the filter cake built up on the walls of the hole often gave trouble in making round trips. Mud weight was maintained from 9.8 to 10.1 lb. per gal. Viscosity ranged from


CEMENT
26 IN. HOLE TO 110 FT.
20 IN. CONDUCTOR PIPE-106 FT.
17½ IN. HOLE
TOP CEMENT UNKNOWN (750 SACKS)
13⅜ IN. CASING-1644 FT.
12¼ IN. HOLE
TOP CEMENT - 4486 FT. (500 SACKS)
9⅝ IN. CASING-5713 FT.
8¾ IN. HOLE
TOP CEMENT UNKNOWN (200 SACKS)
7 IN. CASING-11587 FT.
T.D. 11626 FT.

Casing program for Everglades well

View of motor house looking from derrick floor. Mud pits are in foreground. The board walk leading to the highway can be seen in the left background.

35 to 39 seconds A.P.I. (1,500 cc. in 1,000 cc. out of the funnel).

Except at the surface, no characteristic Gulf Coast sedimentary formations, such as sands and shales, were drilled. For the most part the formations consisted of coral beds, lime, dolomite, anhydrite, chalk and gypsum. Some of the formations, particularly the anhydrite, were fairly hard, requiring rock bits, of which 60 were used. The only fishtail bits were a few at the surface. The hole was extensively cored, a total of 201 cores being taken. All core bits, except one, were of the hard formation type. Coring was by wire line.

Weight on the bit through the entire depth averaged between five and six points, and rotating speed varied from 80 to 100 r.p.m. Slope tests were taken frequently, and maximum deviation recorded was only 1½°. When the slope exceeded 1°, weight on the bit was reduced.

The well was drilled by Loffland Brothers Co., using a diesel-electric rig. This had two generators, one 200-kw. unit for the draw works and a 250-kw. unit for the mud pumps. Each was driven by a 350-hp. diesel engine, operating at 600 r.p.m. A 7¾ by 15-in. pump, driven by a 350-hp. motor, and a 7¼ by 15-in. pump, driven by a 250-hp. motor, were provided for circulating duty. An additional small pump, V-belt driven by a high-speed diesel engine, was used for mixing mud, and auxiliary service. The draw works consisted of a two-shaft, three-speed unit with 9-in. drum shaft.

Because of the boggy soil, the rig was set on a heavy matting foundation. A standard 136-ft. steel derrick on a 15-ft. steel substructure was used. Over-all drilling time, exclusive of completion, totaled approximately 225 days.

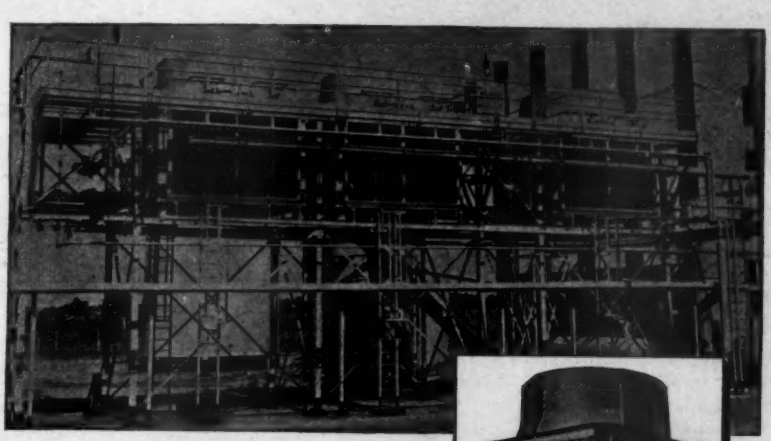
Although in a swamp area, the well is conveniently located, being only 100 yards off a good state highway, and only 25 miles north of the Tamiami Trail. A plank road was laid from the highway into the location and provided all-weather access.

Gas Turbines May Have Part In Postwar Developments

ARRIVAL of the gas turbine will probably be earlier because of war-forced developments of high-temperature alloys, according to Westinghouse engineers. The gas turbine has been just around the corner for many years, but developments yet incompleted in the laboratory indicate that practical gas turbines may be available after the war. Probably they will be used first in locomotives where some economy can be sacrificed for convenience. The first power-house-type gas turbines will probably be small, high-speed geared units (3,000 kw. at 15,000 r.p.m.) of the open-cycle type located near load centers close to the point of utilization of electrical energy. Such prime movers would also be convenient for installation in small generating plants. For larger blocks of power such as required in the main power stations, a battery of small units may be used with the individual units started and stopped (push-button fashion) to operate at peak efficiency. A second later development step may be in the direction of large capacity individual gas turbine units. They would be of the closed-cycle type complete with heat exchangers, etc., and having efficiencies approaching modern steam units. Weight and space reductions will possibly make them attractive also for ship drives.

Abolishes Third Grade to Step Up Aviation Yield

SAN FRANCISCO, Calif.—Standard Oil Co. of California has discontinued making third-grade gasoline in order to step up its yield of aviation motor fuel, H. G. Vesper, manager of the gasoline and fuel-oil division announces.



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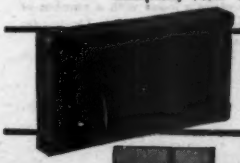

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QUESTIONS on TECHNOLOGY

by W. L. Nelson

Tailor-Made Gasolines

We notice your item about a perfect gasoline. Will you please tell us something practical now in the way of the boiling-range of practical fuels, not ones that are to be used any place or any time?—P. S. A.

The inferred criticism of the item entitled, "A Perfect Gasoline" in the issue of December 9, page 62, is justified. There seems to be a little justification for a single gasoline that can be used in all climates or even one that is suitable for operation between the temperature of 0° F. to 110° F. It can be safely presumed that motorists can purchase different gasolines from season to season. Three general types of gasolines might be provided for all-year operation in different climates, somewhat as follows:

Arctic grade	minus 40° to 50° F.
Temperate grade	0° to 90° F.
Desert grade	40° to 130° F.

The maximum boiling points of such gasolines have been investigated in the same manner as in the question of December 9, and the general volatility characteristics are indicated in Table 1.

An even more practical set of gasolines would be those suitable for an operating temperature range of, say, 50° F., as:

Grade —15	—40° to 10° F.
Grade 15	—10° to 40° F.
Grade 45	20° to 70° F.
Grade 75	50° to 100° F.
Grade 105	80° to 130° F.

The maximum distillation temperature for such gasolines are shown in Table 2.

The data given in Tables 1 and 2 are also shown in Figs. 1 and 2. It will be noted that these are maximum temperatures, and that lower values can be used providing the allowable vapor pressures are not exceeded.

It will also be noted that somewhat higher 50 per cent (or middle) portions of the curves could be used without seriously damaging the warmup characteristics of the gasolines. Gasolines being marketed today have higher 50 per cent boiling points than recommended here, and they are somewhat deficient in warmup characteristics.

TABLE 1—VOLATILITY CHARACTERISTICS OF GASOLINES FOR THREE CLIMATES

	Arctic grade —40° F. to +50° F.	Temperate grade 0° F. to 90° F.	Desert grade 40° F. to 130° F.
10 per cent, A.S.T.M. temperature, max. °F.	84	140	high
18 per cent, A.S.T.M. temperature, max. °F.	...	...	158
37 per cent, A.S.T.M. temperature, max. °F.	...	158	...
50 per cent, A.S.T.M. temperature, max. °F.	135	170	197
64 per cent, A.S.T.M. temperature, max. °F.	158	...	
90 per cent, A.S.T.M. temperature, max. °F.	240	315	340
Reid vapor pressure, lb. per sq. in.	*14	8.4	5

*Could be higher but would then make trouble in shipment.

TABLE 2—VOLATILITY OF 50° OPERATING-RANGE GASOLINES

	—40° to +10° F.	—10° to +40° F.	20° to 70° F.	50° to 100° F.	80° to 130° F.
10 per cent, max. °F.	84	122	high	high	high
8 per cent, max. °F.	...	...	...	158	over 158
13 per cent, max. °F.	...	...	158	...	...
46 per cent, max. °F.	...	158	...	...	...
50 per cent, max. °F.	135	184	205	227	253
64 per cent, max. °F.	158	...	...	...	...
90 per cent, max. °F.	240	297	328	353	370
Reid vapor pressure	(*)	(*)	11.9	7.2	5

*As high as can be handled without large shipping losses.

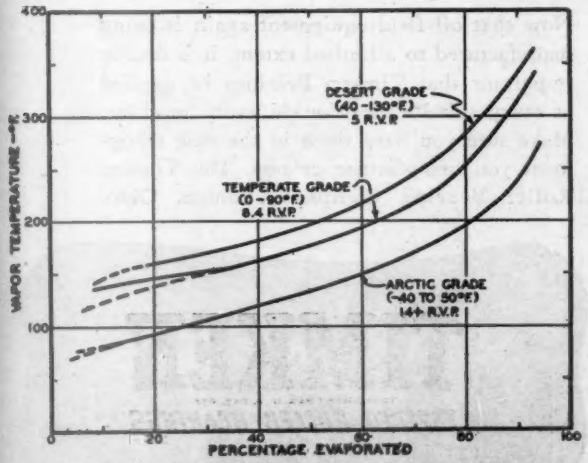

VAPOR TEMPERATURE—°F.
PERCENTAGE EVAPORATED
DESERT GRADE (40-130°F.) 5 R.V.P.
TEMPERATE GRADE (0-90°F.) 8.4 R.V.P.
ARCTIC GRADE (-40 TO 50°F.) 14+ R.V.P.

Fig. 1—Maximum evaporation temperatures of all-purpose gasolines for three climates

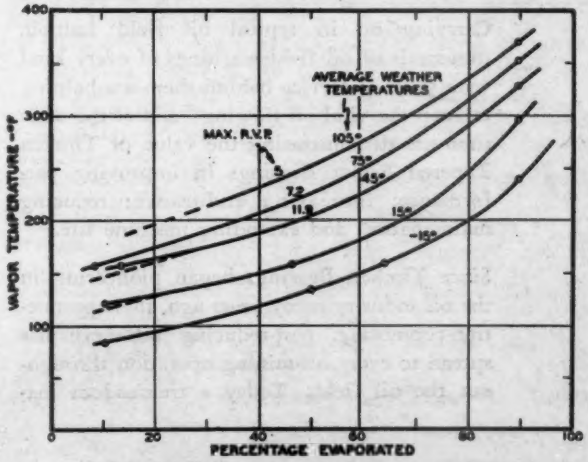
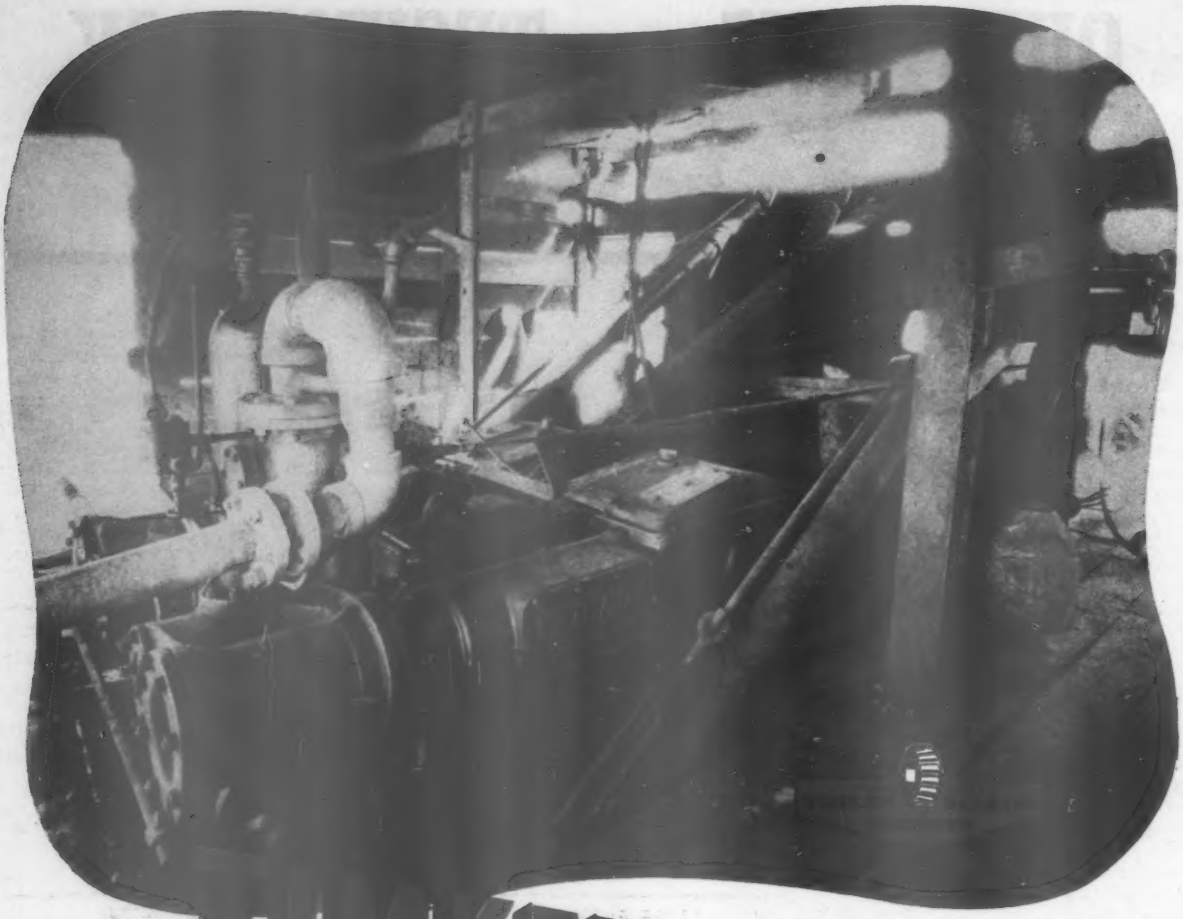


Fig. 2—Maximum temperatures for gasolines for use in 50° F. range of climate



Ideal-Ajax Steam Drilling Engine equipped with Timken Bearings on the crank shaft. The above photograph was taken some years ago. No doubt this engine still is in service.

BEARING EQUIPPED OIL FIELD VETERANS ARE SEEING IT THROUGH!

Carrying on in typical oil field fashion, thousands of oil field machines of every kind with years of service behind them are helping to keep the vital oil flowing—and at the same time are demonstrating the value of Timken Tapered Roller Bearings in improving performance; increasing endurance; reducing maintenance; and extending machine life.

Since Timken Bearings began pioneering in the oil industry many years ago, their production-promoting, cost-reducing influence has spread to every oil-mining operation throughout the oil fields. Today a tremendous majority of all bearings used in oil field equipment are Timken Bearings.

Now that oil field equipment again is being manufactured to a limited extent, it is doubly important that Timken Bearings be applied at every suitable position in every machine. Make sure you have them in the new equipment you manufacture or buy. The Timken Roller Bearing Company, Canton, Ohio.

Cost Engineering

A FEATURE OF THE OIL AND GAS JOURNAL

SECONDARY RECOVERY

WATER-FLOODING COST FACTORS

A WATER-FLOODING project necessitates a thorough understanding of all factors involved and a careful consideration of pertinent cost data. Permeability, porosity, oil content, and formation characteristics which might permit channeling of the water are all important factors to be considered before the water flood is initiated. Different development schemes have been used by various operators; however, the five-spot system has perhaps proved more popular during recent years.

To obtain maximum recovery, the rate of water injection into input wells and oil withdrawal from producing wells must be carefully controlled. In general, slow flooding is desirable for maximum recovery, although an economic balance must be maintained in order that a quicker return in investment costs will result in the greatest amount of profit.

Close Spacing of Wells

Perhaps the greatest disadvantage of water flooding is the large development cost per acre. For efficient flooding, close spacing of wells is necessary. In general, this means that water flooding is suitable only for shallow formations where the development scheme can be carried out at a reasonable cost. To offset this drawback, the high percentage of oil recovery may make water flooding more generally applicable as improved techniques are developed.

A cost analysis involving a waterflood project is shown in the accompanying tables. The estimated cost of development and anticipated income at the time the project was initiated is shown in Table 1. Actual costs and income, as determined after a 6-year period, are shown in Table 2. The general information concerning the project follows:

Project Information

Pertinent data: Area of lease, 50 acres; depth of producing formation, 932 ft.; average thickness of producing stratum, 52 ft.; number of oil wells on lease, 13; average recovery per acre (6-1-37), 8,126 bbl.; oil content, 325 bbl. per acre-foot; oil content, 169,000 bbl. per acre; recoverable oil by water flooding (35 per cent), 295,500 bbl.

Development scheme: Plan, "five spot" program; input wells, 11; new oil wells, 3; acres per water well, 4.54; acres per oil well, 3.12; acres per well, 1.85.

The original plan provided for the drilling and completion of 11 new water-input wells and 3 additional oil wells. The total anticipated development and operating cost over a 6-year period was $89,500. It will be noted from Table 2 that the actual development and operating costs at the time the project was abandoned 6 years later amounted to $145,700. The anticipated recovery at the start of the project amounted to 295,500 bbl. and the estimated profit from the project was $199,600.

The actual trend of production, as shown in Fig. 1, indicated that the production peak occurred about 3 years after initiation of the project. The actual recovery during the 6 years was 118,690 bbl. oil which amounts to only 40 per cent of the original estimate.

In this particular instance the failure of the project was attributed to excessive channeling of the water through the formation. Remedial work undertaken to minimize the channeling action is reflected in the high repair and operating costs. At the time it was abandoned the project had resulted in a net loss of $23,180.

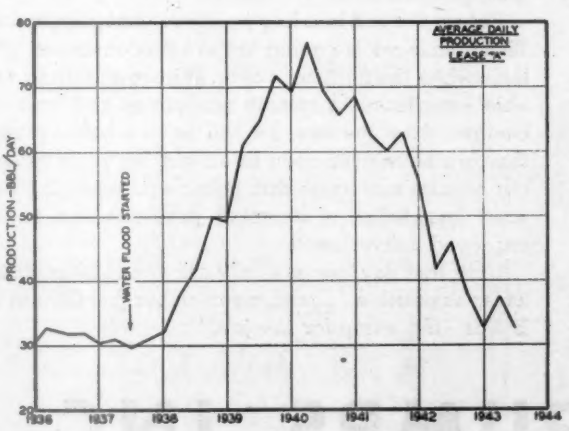


Fig. 1

TABLE 1—ORIGINAL ESTIMATE ON WATER-FLOODING OPERATIONS (JUNE 1, 1937)

A. Cost of Development

Investment:	
Drill and complete 11 water-input wells at $3,000 each	$33,000
Drill and complete 3 additional oil wells at $5,000 each	15,000
Plant investment (water system, pumps, etc.)	12,800
	$50,800
Less salvage value on proposed installation	5,600
Net cost of development	$45,200
Operating:	
Reconditioning work necessary	$4,600
Lifting cost (11 cents per barrel)	32,500
Plant operating	7,200
	$44,300
Total development and operation cost	$89,500

B. Estimated Income From Water Flooding

Recovery, bbl.	295,500
Gross value ($1.12 per barrel)	$330,500
Less one-eighth royalty	41,400
Net income	$289,100
Estimated profit—water flooding	$199,600

TABLE 2—ACTUAL COSTS OF WATER FLOODING (JUNE 1, 1943)

A. Cost of Development

Investment	$57,800
Operating	87,900
Total development and operating	$145,700

B. Income

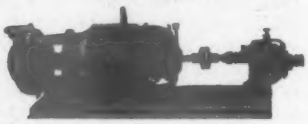
Gross production, bbl.	118,690
Gross value ($1.12 per barrel)	$132,900
Less one-eighth royalty	16,610
Net income	$116,290
Estimated salvage value of equipment installed in 1937	$5,600
Total income (6-1-37 to 9-1-43)	$121,890
Net loss on water-flooding operations	$23,810

a few of the Goulds pumps built for U. S. Landing Craft

Official U. S. Signal Corps Photo

Fig. 3380—2 Stage Centrifugal

Fig. 3640—1" "Close-Cupld" Centrifugal



Dual Fig. 3620 Centrifugal and Fig. 1942 Rotary

. . . . . BUT WE'RE STILL BUILDING PUMPS

This is a frank statement of facts.

Our nation is at war. The very principles upon which this great country of ours were founded are in peril. Our first duty—yes, our foremost desire—is to render every possible aid we can, as a company and as individuals, to the government whose responsibility it is to see this war through to a successful finish in just as short a time as possible.

We have been supplying pumps for the armed services in ever increasing quantities since before Pearl Harbor. Right now, certain shipbuilding programs of the Navy are particularly urgent. Schedules have been stepped up to such an extent that a large share of our facilities are devoted to the production of such pumps as are a vital part of the program. That we have the facilities, that the government has confidence in our ability to produce their requirements on schedule, is gratifying to us. We would not have it otherwise.

We realize, however, that this situation is proving a hardship to our regular customers—customers, who in many cases, have been buying their pumps from us for years. Their need for pumps is undoubtedly urgent but this is war and our first responsibility is to our fighting men. Whatever facilities we have available, beyond the needs of these extremely urgent programs, are at the disposal of our customers for priority orders. As these facilities permit, we will endeavor to the best of our ability to take care of their pump requirements, making the best possible delivery we can under these difficult conditions.

But we *are* still building pumps . . . and pumps alone. That means we are going to have no conversion problems when the fighting is over. We are acquiring valuable experience in volume production and improved designs. After the war, we will be in a better position than we have ever been in all our 96 years to serve our regular customers with better equipment, a broadened knowledge of pumping problems and to give improved deliveries.

Until that day, we can only ask you to bear with us as far as possible . . . and to remember that Goulds still builds "*the* pump for *the* job."

Goulds PUMPS, INC.

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Engineering Fundamentals

No. 119

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

MEASUREMENT OF MUD DENSITY

THERE are three different methods which, if properly applied, will give mud density measurements within the practical limits of accuracy. These three methods will be described, and certain rules mentioned which should be observed in order to obtain accurate readings.

A hydrometer especially designed for use with drilling muds is probably the most widely used method of measuring mud density. It consists of a polished duralumin float and stem. The top of the hollow stem is removable in order to allow addition or removal of lead shot for calibration purposes. A bakelite cup is made to attach to the lower end of the float when placed against the float, with the lugs on the cup matching notches on the bulb at the bottom of the float, and turned to the right. The cup is removed by turning to the left and pulling away from the float. A cylindrical water container is furnished with the hydrometer. This container also acts as a carrying case or protective case for the hydrometer when not in use.

In making a test the calibration of the hydrometer is first checked. This is accomplished by removing the bakelite cup from the float and filling it with pure water at approximately 70° F. The cup is then placed on the float while holding them in an upright position, allowing the bulb of the float to force the excess water from the cup. The cup is turned to the right until tightly engaged. The hydrometer is now immersed in water (at about 70° F.) in the cylindrical container and a reading taken on the scale of the square stem at the water level when the hydrometer is freely floating and motionless.

The stem is graduated on the various sides with pounds per gallon, pounds per cubic foot, specific gravity, and pounds per square inch per 100 ft. of depth. Then, the calibration reading taken above should be either 8.34, 62.4, 1.00, or 43.3, depending upon which side of the stem is read. In case the calibration reading does not check the above values, the top of the hydrometer stem is removed and lead shot added or removed until the correct reading is obtained on the calibration test.

In reading the density of a mud sample, the bakelite cup is filled with the mud and attached to the hydrometer float as in the calibration test. Excess mud is wiped from the outside of the float. The float and mud-filled cup are then immersed in the water-filled container as before and the mud-density reading taken at the water level on the graduated stem after it comes to rest.

To obtain the highest degree of accuracy with this instrument, the following precautions should be observed:

1. All mud-density readings should be taken with the temperature of both the mud and the water within 10° of the temperature at which the calibration was made.
2. The cup and float should be kept thoroughly clean.
3. Kinks and bends in the float and stem should be avoided.
4. Only clear, fresh water should be used when calibrating and in the water container when reading mud density.
5. Vibration on the derrick floor or movement of the floating hydrometer due to wind may cause erroneous readings. For this reason, readings should be taken away from the wind and with the water container resting on a solid level support.

The Mud Balance

An extremely durable and simple beam balance has been developed especially for reading the density of drilling mud. The device is illustrated in Fig. 1. A graduated beam A carries a knife-edge B which rests on a base C. The beam carries a counterweight D which, along with the weight of the beam and a rider E, balances the weight of a constant volume mud container F on the other end of the beam. The beam is graduated in at least two of the following four sets of units: Pounds per gallon, pounds per cubic foot, specific gravity, pounds per square inch per 100 ft. of depth. A metal case is provided for protection and for carrying the balance.

In making a mud density test, the lid G is removed and the cup filled with a sample of the mud. The lid is replaced and rotated until firmly seated to expel any excess mud through a vent hole in the lid. Any mud adhering to the outside of the instrument is then washed or wiped off. The balance arm is now placed on the base with the knife edge resting on the fulcrum. The rider E is moved until the beam is balanced. The balanced position of the beam is determined either by the level on the beam or by noting the position of the balance arm with respect to its being parallel with the arm H extending from the base. The density of the mud is then read from the scale of the beam at the left-hand edge of the rider E.

The mud balance is a handy method of weighing mud. Its principal advantages are its simplicity and durability. In order to get accurate readings, it is important to keep the balance clean; particularly any dried mud should be completely removed from the cup before each density test.

A bucket and spring balance may be used for determining the density of the mud if proper care is used in choosing the equipment and procedure. The bucket is filled with mud and weighed. It is then filled with water at the same temperature and weighed. The observed weights are then corrected by subtracting the tare weight of the bucket from each. The specific gravity of the mud is then calculated by dividing the weight of the mud by the weight of the water.

Due to the fact that it is difficult to keep a suitable bucket for the purpose, and because spring balances get out of adjustment rather easily, this method is not recommended unless neither of the other two devices is available.

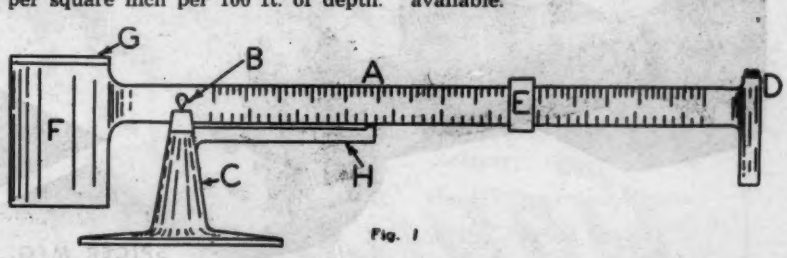

Fig. 1

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

What General Montgomery said to Major General Gatehouse

about the great combat record
of the flexible ACF · M3 Tank
using Spicer Transmissions

Dofoac/y8

MAIN HQ EIGHTH ARMY.
C.M.F.

My dear Gatehouse

18 SEPT. 43

... We have during our past battles been equipped with many types of American tanks, designed and developed by the Ordnance Department, United States Army, and so ably produced by American industry. Each one has proved itself in battle to be a first class machine and has enjoyed the full confidence of the crews which have fought with them.

The first tank we had was the .... Light M3, made by the American Car and Foundry Company. This is one of the most reliable and handy tanks that has ever been produced. It fought in the desert battle in Libya in 1941 and has fought with distinction in every battle since that date. We have them with us here in SICILY where again they have proved invaluable.

Yours sincerely
B. L. Montgomery
General
Eighth Army.

"THE HONEY"

"We quickly termed these original M3 Tanks 'The Honeys,' and with them we were very largely responsible for the severe defeat inflicted upon Field Marshall Erwin Rommel in October and November, 1941."

Major General A. H. Gatehouse, DSO, MC
British Ministry of Supply Mission

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REFINING

Midwest Refiners Propose Utilization of Texas Crude

CHICAGO.—Utilization of Texas crude is one measure which will be proposed to Petroleum Administrator Harold L. Ickes with a view of putting idle refinery capacity in the Midwest into operation, following a conference of independent refiners here last week. If remedial steps are not taken, a spokesman said, there will be an idle refining capacity of 300,000 bbl. a day by next June.

B. L. Majewski, vice president of Deep Rock Oil Corp. and chairman of the petroleum industries marketing committee for District 2, said the plan for relieving the crude shortage which will be laid before the petroleum administrator contains the following suggestions:

1. Use of the WEP 20-in. products line from Texas to Norris City, Ill., to carry into the district 100,000 bbl. of crude oil daily for 100 days.

2. Shipping 50,000 bbl. a day of West Texas crude oil into the district under an arrangement in which all refiners would be reimbursed by the Government for the difference between freight rates and the cost of moving the oil by pipe line.

3. Relaxation of spacing regulations to permit the drilling of new oil wells on 10-acre locations instead of 40 acres.

Ickes Says Octane Ratings Of Gasoline Must Be Met

WASHINGTON, D. C. — Minimum and maximum ratings for motor gasoline manufactured or used in the East Coast states (District 1) must be met, Petroleum Administrator Harold L. Ickes emphasizes. No min-

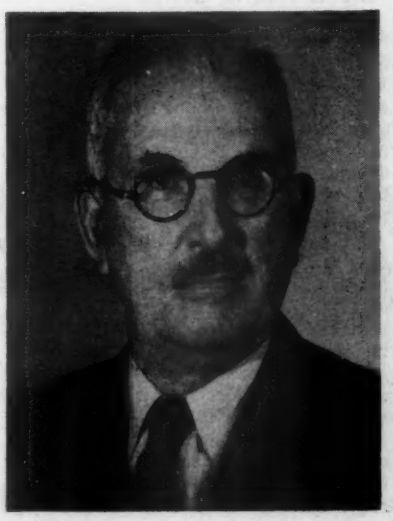
Sketches of Plant Operators

FRED W. GREY was born in London, England, in 1873. He was educated at United Service College in Devonshire, then went to Canada to the O. A. College in Guelph, Ont. His first job was with the Uvalde Asphalt Co. at Cline, Tex., in 1894, running a rock crusher. Then he rose through various departments, holding jobs as boiler fireman, engineer, pit foreman, warehouse man, general foreman and finally superintendent in 1901. This plant extracted asphalt from mined rock under the Frash patents.

Having learned all he could in this plant and wanting to get into the paving business, he resigned and accepted a position as foreman with the Barber Asphalt Paving Co., in Los Angeles, Calif. In 1904 he went to Mexico for E. L. Doheny as superintendent of the Mexican Paving & Construction Co., where he remained until 1914. He returned to the states and went to the American oil fields, also owned by the Doheny interests, near Bakersfield, Calif., to gain experience in crude-oil production.

He was granted a leave of absence in 1917 to do war work and was in charge of construction of the Solvay Process plant at Saldura, Utah, for the reclamation of potash.

In 1919 he went to Destrehan, La., where he was employed by the Mexican Petroleum Corp., which was then owned by Doheny. His first position there was in charge of labor and pipefitting gangs. Subsequently he was appointed warehouse man, general plant foreman, assistant superintendent and since 1928 has been superintendent of the refinery which is now operated by Pan American Petroleum Corp.



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imum octane limits are imposed by Petroleum Administration for War regulations except in District 1.

"In the East Coast states," Ickes explains, "both the minimum and maximum octane rating of house-brand regular gasoline are identical, having been set at 72 octane. Similarly, premium gasoline for these states must have both a minimum and maximum rating of 76 octane.

"The minimum ratings were established under PAW's Directive 59, which affects East Coast states only. The maximum of 72 and 76 octane were established on November 8, 1943, when PAW issued a nation-wide refining operating directive that affected the maximum ratings of both gasolines throughout the country. Thus, in the East Coast the maximum and minimum ratings are identical, being 72 octane for house-brand and 76 octane for premium gasoline. The remainder of the country is affected only by the maximum ratings of 72 and 76.

"The specifications are not in conflict and neither supersedes the other. Both are in effect."

Ickes' statement was prompted by inquiries from some refiners who indicated they believed the specifications as announced by PAW were in conflict.

Minimum Specifications for Oil Products Amended

WASHINGTON, D. C.—Minimum specifications for certain petroleum products in District 1 have been amended by Petroleum Administration for War, the new specifications being effective as of December 23, 1943. The order, issued pursuant to Directive 59 as amended December 1, 1943, says:

Section 2 of the specifications issued October 17, 1942, is hereby revised to read as follows:

2. Kerosene.—Kerosene shall conform to certain minimum requirements of the Federal Specification VV-K-211a, approved April 9, 1941, and any amendments thereto that may be issued from time to time, as follows: Section B. Grades; Section D. General requirements; Section F. Methods of sampling, inspection, and tests.

Except that the burning test specified in Section F-3 of Federal Specification VV-K-211a shall have a limit of 16 hours minimum instead of the limit of 24 hours minimum provided in said specification.

Section 3 of the specifications issued October 17, 1942, is hereby revised to read as follows:

3. Fuel oils.—Distillate fuel oils (including gas oils) and residual fuel oils shall conform to certain minimum requirements of the corresponding fuel oil set forth in Fuel Oils (fifth edition), Commercial Standard CS-12-40, effective January 5, 1940, and any respective amendments thereto that may be issued from time to time, as follows: Section 1. Scope; Section 2. General requirements; Section 3. Detail requirements (whenever applicable geographically); Sections 5 to 16, inclusive (whichever are respectively applicable). Methods of test.

Except that the requirements of said Commercial Standard CS-12-40 shall be modified as follows:

1. For No. 1 fuel oil the maximum temperature for the 10 per cent point shall be 420° F. instead of 410° F.

2. For No. 2 fuel oil the maximum temperature for the 10 per cent point shall be 460° F. instead of 440° F.

Minimum specifications for other principal petroleum products heretofore issued shall remain in effect.

Control Valves, Regulators Unaffected by Restrictions

WASHINGTON, D. C. — Control valves and regulators for hydrogen fluoride service are exempted from the restrictions on inner valve and seat-ring construction contained in Limitation Order L-134 through an amendment to the order issued by War Production Board. These valves are used primarily in gasoline production, and the exemption is essential from an engineering standpoint, WPB said.

WMC Issues Call for More Refinery Workers

DENVER, Colo.—An urgent call for workers needed in 100-octane gasoline plants being built in Utah and Wyoming was issued last week by War Manpower Commission. At least 400 steamfitters, pipefitters and plumbers and 150 laborers are demanded at the new plant of Utah Oil Refining Co., Salt Lake City, according to a communication sent by WMC to 93 U.S. Employment Service offices in Wyoming, Colorado, Utah, and Idaho. Additional men, particularly asbestos-pipe coverers and pipefitters, are sought at plants in Cheyenne and Rawlins, Wyo.

Ashland's $12,000,000 Plant Nearing Completion

ASHLAND, Ky.—The new aviation-gasoline plant of the Ashland Oil & Refining Co. now being constructed here will cost approximately $12,000,000. Currently, about 1,100 men are employed on the project. Completion is scheduled within the next few weeks.

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PIPE LINES

WEP Maintained High Crude Throughput in December

Deliveries through the 24-in. crude-oil line of War Emergency Pipelines, Inc., were consistently high during December 1943 in spite of difficulties which are incident to bringing facilities up to capacity which are as extensive as the extension eastward from Norris City, Ill. Shipments out of Longview, Tex., amounted to 8,745,873 bbl. At Norris City, 459,618 bbl. were diverted via the Ohio Oil Co. and Tuscarora Oil Co., Ltd., for delivery at East Coast points. The amount delivered by WEP into tanks in the New York and Philadelphia refining areas was 8,048,098 bbl.

Stocks of refined products have been accumulated at Baytown and Beaumont, Tex., preparatory to starting shipments through the WEP 20-in. line which may be ordered soon. Because of the desirability of drying the line with gasoline, a shipment of about 150,000 bbl. of motor fuel probably will precede heating oil going into the line.

Stanolind Lets Contract For Wasson Spur Line

Stanolind Pipe Line Co. awarded contract to R. H. Fulton Co. for laying 10 miles of 8-in. from the Wasson field, Texas, to connect with Magnolia Pipe Line Co.'s 8-in. line which extends south from the Slaughter field via Seminole to the company's system at Midland, Tex.

By the arrangement between Stanolind and Magnolia, 20,000 bbl. daily of Wasson oil is to move south through the Magnolia line for Magnolia interests and 12,000 bbl. daily will move northward, from the junction of the 10-mile spur, through the Magnolia line for delivery to Stanolind at Slaughter for shipment through that company's 16-in. line now under construction to Drumright, Okla.

When the 16-in. line is completed Stanolind expects to obtain from Magnolia approximately 30,000 bbl. daily from the Slaughter field which will probably become available after allowables have been raised.

Crude oil totaling 32,000 bbl. daily which will come through the 10-mile spur for Stanolind and Magnolia destinations will be gathered by Humble Pipe Line Co. and Shell Pipe Line Corp. systems serving the Wasson area at present.

Completion of Canol Line Scheduled January 15

FORT NORMAN, N. T.—A mid-December report from Dawson Creek, on the Alaska Highway, indicates that the Canol pipe line from Norman Wells, N. T., to Whitehorse, Yukon, will be completed around January 15. With crews working from both ends, between 80 and 100 miles of line remained to be laid.

Construction is proceeding on the refinery at Whitehorse which is scheduled for completion by next May. Delivery of crude through the line will be started as soon after its completion as storage or refinery facilities are available at Whitehorse to handle the oil.

Yale Plans to Lay 6-in. in Montana This Winter

Yale Oil Pipe Line Co., according to an announcement by PAW, intends to lay 6-in. pipe this winter in connection with its project for building an 82-mile system of 6-in. and 8-in. pipe in Montana.

A decision has been reached that the 8-in. main line will extend from Warren, Mont., to a point north of the Yellowstone River, about 4 miles northwest of Billings, Mont., a distance of 52 miles.

A pump station will be constructed at this location, together with sufficient storage to permit pumping crude to Laurel and Billings, Mont., refineries through a 17-mile 6-in. line. Pump stations will also be situated at Elk Basin and Warren.

Standard of Louisiana Lays Holly Ridge Outlet

Standard Oil Co. of Louisiana is laying 17 miles of 8-in. to provide an outlet for the Holly Ridge field of Tensas Parish, Louisiana. The route of the line will extend through Lake St. John to Gibson's Landing, La., on the Mississippi River.

Humble to Provide Outlet for Mascho Pool

The War Production Board has authorized Humble Pipe Line Co., Houston, Tex., to lay a 6-in. pipe line to the Mascho oil pool of southern Andrews County, the only sizable oil pool in the West Texas Permian basin, currently without pipe-line outlet. Current production is being trucked from the pool. The line will be 15 miles long and will connect with the company's pipe-line pump station in Ector County, Texas. The pool has more than 50 wells. Humble has started survey for the line and will speed its completion.

Effort to Oust Head of Mokan

Formation of a stockholders committee with a stated intention of ousting William G. Maguire as president of the Missouri-Kansas Pipe Line Co. (Mokan) was announced recently.

The committee was made up of Howard Butcher, a Philadelphia broker; A. F. Dixon, a director of the company, and J. W. Taylor, of the Security Trust Co. of Delaware and claimed to represent holders of more than 210,000 shares of Mokan "B" stock, of which a little more than 700,000 shares are outstanding in the hands of the public.

In soliciting proxies for any future meeting of the company, the stockholders committee made various charges against Maguire, including that of active planning to gain control of Panhandle Eastern Pipe Line Co.

The charges were denied by Goeffrey Mellor, vice president of Mokan, who said the efforts of the committee were inspired "by persons whose employment by Mokan has been terminated." He said the charges would be answered in full at a later date.

Gasoline Shipments by Pipe Line Set Record

Pipe-line transportation of gasoline in October was much greater than that of a year earlier, and showed an increase from September. Movement of gasoline in pipe lines in the first 10 months of 1943 registered a considerable increase from the corresponding 1942 period.

Calculations from Bureau of Mines figures indicate that the volume of gasoline transportation by pipe line was approximately 36 per cent of the total production of motor fuel in October, whereas a year earlier the pipeline gasoline movement was only about 24 per cent in volume of the somewhat smaller total of motor-fuel production.

Motor fuel turned into pipe lines in the first 10 months of 1943 totaled 168,198,000 bbl., against 102,138,000 bbl. in the corresponding 1942 period, an increase of 64.68 per cent.

Total motor fuel turned into lines in October was 20,534,000 bbl., compared with 19,986,000 bbl. in September, and 12,255,000 bbl. in October 1942, an increase of 67.56 per cent. The increase from September was 2.74 per cent.

Motor fuel delivered from lines in the first 10 months of 1943 totaled 165,827,000 bbl., against 101,934,000 bbl. in the corresponding 1942 period, an increase of 62.68 per cent. In October, the total delivered from lines was 20,747,000 bbl. against 19,310,000 bbl. in September, and 12,260,000 bbl. in October 1942, an increase of 69.23 per cent from a year earlier.

Stocks in lines and working tanks at the end of October totaled 8,099,000 bbl., compared with 8,406,000 bbl. a month earlier, and 5,997,000 bbl. a year earlier.

O.P.L. Buys Allied System at Pickens, Miss.

Oklahoma Pipe Line Co., subsidiary of Standard Oil Co. (N.J.), has expanded its operations in Mississippi through purchase of Allied Pipe Line Corp.'s gathering system in the Pickens field of Madison and Yazoo counties. The purchase includes 13 miles of line, storage facilities and a 20-car loading rack situated on the Illinois Central Railroad near the town of Pickens, Miss.

Allied, as well as operating the gathering system in this field, is one on the principal purchasers of crude oil produced there and will continue to purchase supplies from Pickens to meet its requirements.

Oklahoma Pipe Line Co. will establish a district office in Jackson, Miss. In charge will be Dallas Luttes, formerly division engineer at Wewoka, Okla.

ODT Advises Economy In Use of Tank Cars

WASHINGTON, D. C.—A warning that difficulties are again looming in domestic oil transportation was issued here last week by the Office of Defense Transportation to shippers, transporters, and receivers of petroleum and petroleum products.

Despite completion of the big-inch crude-oil pipe line and near-completion of the little big-inch products line from Texas to the East Coast, ODT petroleum transport officials said that changing domestic conditions make it imperative that there be no letdown in the transportation effort.

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Natural Gas

Kansas and Missouri Cities Face Shortage of Gas

OKLAHOMA CITY, Okla.—Topeka and Wichita, in Kansas, and Kansas City and Joplin, in Missouri, face serious shortages of gas this winter unless larger withdrawals from the Cement gas field, in this state, are allowed, the state Corporation Commission was told last week. Demand is "considerably greater" than it was a year ago, R. T. Wells, chief engineer for Cities Service Gas Co., reported to the commission.

Wells said his company marketed 16,000,000,000 cu. ft. of gas in Oklahoma during 1942.

Earl Foster, commission conservation attorney, said the board had warned gas distributors last summer to "build up a surplus" for winter, but that little preparation had been made.

Railroad Commission Opposes Gas Export

AUSTIN, Tex.—Opposition to gas exports not needed for war purposes was expressed here this week in a year-end account of Railroad Commission operations. The commission's statement also implied resentment to conditions that permit applicants to bypass the state authorities in the field of regulating pipe lines and utility rates.

"The commission made studies and a determined effort to curtail and eliminate the waste in natural gas in the fields of Texas," stated Beauford H. Jester, chairman.

"There is still far too much gas being wasted," he continued. "The factor of cost and economics in saving and utilizing the gas makes it impractical to and a legal difficulty for the commission to enforce hard and fast rules preventing waste of natural gas. A great reduction in the wastage of gas has been obtained in the Cayuga and Long Lake fields during 1943. The problem is still under study in this and other fields.

"The federal and interstate nature of the application of the Tennessee Gas Distributing Co., Chicago corporation for the 1,200-mile natural-gas line from Corpus Christi to Kenova, W. Va., enabled this application to bypass Texas authorities and governmental agencies. The majority of the commission have expressed their disapproval of this pipe line and any plan to drain Texas of natural gas or its other natural resources not needed for the war effort, and that could be better utilized in developing industry in Texas; and protest was made to the Federal Power Commission which authorized the gas pipe line.

"With the FPC now dominating the field of rate fixing, the principal work of the Gas Utilities Division in 1943 has been in the distribution of butane and in the supervision of proper installation of butane-supply equipment. The manufacture and use of butane is steadily increasing. It will further increase after the war, when butane equipment is more readily obtainable."

Canadian Natural-Gas Production Declines

CHATHAM, Ont.—Natural-gas production from Canadian fields in 1943 showed a decline of nearly 2,500,000,000 cu. ft., preliminary estimates showing a total of 43,237,000,000 cu. ft. for 1943 against 45,697,359,000 for 1942. Comparative figures follow:

CANADIAN GAS PRODUCTION
(Thousands of cubic feet)

Province—	1942	1943
New Brunswick	619,380	670,000
Ontario	10,476,770	8,005,000
Saskatchewan	117,124	111,000
Alberta	34,482,585	34,450,000
Northwest Territories	1,500	1,500
Total	45,697,359	43,237,500
Value	$13,301,655	$11,699,894

There was a marked contrast between 1943 drilling operations in Alberta and Ontario, the two major producing provinces. In the former, all that was required to maintain reserves was the drilling of a few large wells in proven fields. However, two new fields were opened, one in the Pouce Coupe area, near the Alaska Highway, where a 5,000,000-cu. ft. gasser was completed, and another in the Athabaska area, north of Edmonton, with 19,000,000 cu. ft. initial production.

On the other hand, Ontario operations consisted of widespread drilling both of proven and wildcat areas, in which producers as low as 20,000 cu. ft. a day or even less were welcomed as aids to a waning supply. One small new field in Zone Township, Kent County, was opened.

SEC Approves Lone Star's Sale of Galveston System

PHILADELPHIA, Pa.—Sale of Lone Star Gas Co.'s production and distribution system serving Galveston, Tex., to Texas Public Service Co. for $2,383,000 was approved last week by Securities and Exchange Commission.

Lone Star will apply the proceeds to the reduction of its outstanding $16,250,000 bank loan notes owing to Union Trust Co., Pittsburgh, and certain other banks.

Natural Gasoline

Problems Rise in California's Supplies of Liquefied Gas

SAN FRANCISCO, Calif.—War-created problems of transportation, container and diversion have developed in California's liquefied petroleum-gas business, which has grown fivefold in the past 6 years. The position of consumers is not yet serious, however, and Petroleum Administration for War says necessitous use will be protected.

The immediate problem is largely with liquefied butane gas, as butane becomes more and more important for isobutane fractions in the 100-octane aviation gasoline program.

Six aviation-gasoline plants are now complete in California and seven more will be finished this year. In addition, at least one large toluene plant is expected to be shifted to the aviation-gasoline program.

Figures for 1943 on the California liquefied petroleum gas operations have not been released, but in 1942 about 22 per cent of such gas supplied was butane, about 26 per cent propane and about 52 per cent butane-propane mixture.

Twenty-three petroleum-refining and natural-gasoline companies supplied 585,440,000 gal. of liquefied gases in 1942, but most of the business was represented in operations of Standard Oil Co. of California, Shell Oil Co., Inc., and Union Oil Co. of California.

Although butane, unmixed, represented only about a fifth of total volume on the West Coast in 1942, it is now a real crux of the general consumer situation, for the reason that it is better suited to the small user than propane, and even when delivered in a butane-propane mixture, requires conversion adjustments of equipment.

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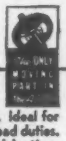

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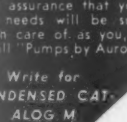

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Exploration and Drilling

Week's Highlights

THE old political axiom "as goes Maine so goes the nation" has its counterpart in the petroleum industry with a superimposition of Texas in the simile. This parallel adds pertinency to the Railroad Commission's year-end summary of operations which was released at Austin, Tex., last week. Results from Texas exploratory and exploitation operations last year serve the added purpose of indicating extent of the drilling requirements for 1944 in meeting the demand for 25,000 new wells and record volumes of crude oil.

Vital statistics of the petroleum industry's operations in Texas last year are summarized in the following table:

Operation—	1942	1943	Change
Production*	477,828	587,759	109,931
Discoveries	84	114	30
Dual completions	66	144	78
Drilling permits	4,571	5,017	446
Rule 37 exceptions	782	403	†379
Oil completions	3,006	2,263	†743
Gas completions	230	187	†43
Dry holes	1,197	1,523	336
Wildcats drilled:			
Oil	82	73	†9
Gas	30	21	†9
Wells plugged:			
Dry	1,185	1,251	66
Gas	77	101	34
Oil	1,386	1,290	†96
Total plugged	2,648	2,642	†6

*Thousands of barrels. †Indicates decrease.

The increase in the number of dual completions is emphasized by the commission which reported that 86 of the total in this classification for 1943 were oil-oil producers and two were triple-zone wells in the Lake Creek field. In the previous year, all 66 dual completions were oil-gas wells. There is slight doubt in the minds of operators that dual completions will increase at an even more substantial rate in 1944 with the practice spreading to other states where multiple-producing zones offer the incentive of maximum production with minimum drilling and expenditure of equipment. Determination of operators to test sedimentary deposits to maximum depth is confirmed in numerous drilling wells now active. Where structural conditions justify, operators are passing up assured production temporarily in order to explore deeper potential oil zones.

The increase of 30 in new field discoveries in 1943, the commission points out, does not give a true reflection of the success in exploratory operations. The fields were smaller in the amount of oil discovered and were much more expensive to develop because of increases in the cost of labor, materials and over-all operating expenses.

A routine crop of wildcat completions and indicated discoveries was reported for the last week of the year.

SOUTHWEST TEXAS: A major extension to the deep oil pay at 7,300 ft. appeared probable in the Agua Dulce field, Nueces County (p. 80).

OHIO: A second well northeast of the extension discovery in the east end of the New Straitsville field, Perry County, appears capable of larger production than the first successful strike (p. 84).

WEST TEXAS: The best producer yet in the McKee pool in Crane County which produces from the McKee sand of the Simpson series, Upper Ordovician, appeared assured on preliminary tests (p. 78).

FLORIDA: Production of 75 to 100 bbl. of oil daily in the Sunniland discovery is accompanied by 500 bbl. of water in first stages of an extended production test for determination of the well's commercial quality.

COMPLETIONS IN ALL FIELDS . . .

(Week ended January 1, 1944)

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1943	1942
N.Y., Penna., W. Va.	47	8	1	56	54,607	3,463	3,449
Ohio	7	14	21	42	80,309	980	1,123
Indiana	0	0	5	5	11,093	229	332
Kentucky	1	0	2	3	5,396	476	199
Illinois	19	0	11	30	79,725	1,804	1,852
Michigan	9	0	7	16	51,392	643	669
Kansas	31	1	7	39	104,650	1,715	1,535
Nebraska	0	0	0	0	0	28	36
Missouri-Iowa	0	0	0	0	0	18	13
Oklahoma	3	1	9	13	48,147	1,199	1,197
Texas:							
North Central Texas	20	0	18	38	116,794	1,519	1,029
West Texas	2	0	3	5	27,235	923	1,280
Texas Panhandle	0	0	0	0	0	183	335
Eastern Texas	5	2	0	7	46,057	316	398
Texas Gulf Coast	7	1	5	13	101,891	487	682
Southwest Texas	10	0	5	15	71,378	953	1,013
Total Texas	44	3	31	78	363,155	4,381	4,737
North Louisiana	1	2	3	6	24,254	349	477
Louisiana Gulf Coast	6	0	1	7	67,491	365	443
Total Louisiana	7	2	4	13	91,745	714	920
Arkansas*	5	0	1	6	21,387	281	178
Mississippi and Southeast	0	0	1	1	4,006	110	64
Montana	4	1	2	7	16,143	241	203
Wyoming	5	0	0	5	22,014	138	110
Colorado, Utah	0	0	0	0	0	30	28
New Mexico	2	0	2	4	11,790	245	240
California	16	0	3	19	86,940	1,396	816
Total United States	200	30	107	337	1,092,499	18,091	17,699
Total previous week	221	43	107	371			
Week ending Jan. 2, 1943	155	28	99	282			

*Last week's total, 275.

PERMIAN BASIN

Magnolia Well Looks Like Best One in McKee Pool

MIDLAND, Tex.—Magnolia Petroleum Co. 3 Glenn, Section 20, Block 1, H.&T.C. Ry. Survey, Crane County, indicated that it would be the best well yet completed in the McKee pool, which produces from the McKee sand of the Simpson series, Upper Ordovican. This southwest outpost was flowing at the rate of 27 bbl. per hour from pay topped at 6,078 ft., total depth 6,140 ft. It will be the third producer for the pool, which was discovered in September 1942. Magnolia 1 Glenn was good for 225 bbl. daily, and the second producer was completed for 327 bbl. after the northeast offset to the discovery proved dry in drilling into the Ellenburger at 6,950 ft. and continuing to total depth 7,204 ft.

Many operations throughout the district was suspended for the holidays.

Winkler County.—Gulf Oil Corp. 46-0 Keystone, Section 6, Block B-2, Public School Land, southeast outpost to the Key-Ellen pool, assured production from the Holt pay of the Permian lime when it showed 560 ft. of 35-gravity oil on drill-stem test. It is drilling ahead to test the Ellenburger horizon. This well is 1¼ miles southeast of the Ellenburger discovery and ½ mile southeast of the Holt pay discovery. Sinclair Prairie 1 Seth Campbell, Ordovician wildcat in Section 11, Block B-5, Public School Land, 8½ miles south of Key-Ellen, is fishing at 9,333 ft.

Dawson County.—Seaboard Oil Corp. 1 Spraberry, Section 38, Block 34-5n, T.&P. Ry. Survey, which has been plugged back to 6,908 ft. from total depth 7,679 ft., swabbed for 9 hours and recovered 43 bbl. fluid, 12 bbl. of which was oil and the rest water, with the fluid level standing 2,500 ft. from the top. Casing is cemented at 6,600 ft. Operators believe the water is coming from the open hole below this depth and that it can be plugged off and the well completed for a producer. Nearest production is the Cedar Lake pool of Gaines County, which is 30 miles west by north.

Lynn County.—Sohio Oil Co. 1 Allsup, Section 113, Block 12, E.L.&R. R. Survey, topped the San Andres at 3,850 ft., and was drilling below 5,200 ft. with no shows reported. The same company has announced another wildcat for northeast Lynn County, to be 1 A. A. Rinne, SE SW Section 262, Block L, B.S.&F. Survey, 7 miles southeast of Wilson.

WEST TEXAS WILDCAT COMPLETIONS

Crosby County: Forest Development and H. F. Vogel 1 A. L. Robertson, 660 ft. from S & W, Sec. 18, Blk. B-9, E.L.&R.R. Sur., elev. 2,676 ft., San Andres 2,488 ft., S.S.O. 3,170-3,200 ft., 3,365-75 ft., dry at 3,515 ft.

Ector County: Grisham-Hunter Corp. 1 W. F. Cowden, 660 ft. from S & W, Sec. 10, Blk. 45-2n, T.&P. Ry. Sur., deep test in North Goldsmith pool, dry at 6,499 ft.

Pecos County: Siemoneit & Wahlenmaier 1 V. Crockett, W¼ W¼ Sec. 28, Blk. 2, H.&T.C. Ry. Sur., elev. 2,372 ft., Ellenburger 4,700 ft., dry at 4,812 ft.

SOUTHEAST NEW MEXICO

HOBBS, N. M.—Developments in Southeast New Mexico were slowed by the holidays. The four completions reported were in Eddy County. One was a dry hole on the southeast side of the Grayburg-Jackson pool, drilled to total depth of 3,425 ft. by Premier Petroleum Co. New depths were reported on the two Ellenburger wildcats in southeast Lea County. Humble Oil & Refining Co. 1 Federal-Leonard had reached 8,825 ft., and El Paso Natural Gas Co. 1 Ginsburg had drilled below 8,230 ft. in lime and shale. H. P. Taubman 1 Sun-State, west of the Vacuum area, was drilling at 5,050 ft., below the regular pay.

TEXAS GULF COAST

Wharton County Discovery Is Near Completion

HOUSTON, Tex.—As 1943 ended Seaboard Oil Co. of Delaware was bringing in the final field of the year in the Texas Upper Gulf Coast district at the 1 W. W. Duson in E.T.R.R. Sur. A-118, 4½ miles northwest of Danevang in Wharton County. Before setting casing, drill-stem test at 6,145-50 ft. had recovered 1,400 ft. of pipe-line oil in 10 minutes with 2,400-lb. bottom-hole pressure. Other drill-stem tests at 6,150-55 ft. and 6,155-60 ft. had also yielded about the same amount of oil. The 5½-in. casing was set and as the year ended it was cleaning into pits on production gage.

Sun Oil Co. has so far been unsuccessful in completing the 1 Maurice Hirsch estate, wildcat 4 miles northwest of Huffman in Harris County, James H. Isbell Survey, but has run electric log and is preparing to squeeze and shut off the water which appeared in initial tests. It had been testing in perforations at 8,480-90 ft. flowing 1½ bbl. per hour on ⅛-in. choke, of which 25 per cent was oil. Total depth was 8,821 ft. in shale. Also in Harris County, Texas Co. is testing a sand at 5,500-25 ft. in the 54 Stevenson-fee, deep test on east side of Humble dome, swabbing at last report showing some oil and gas. This sand is between the 5,320-ft. Yegua sand and the sand at 5,800 ft. which the company opened to production on east flank in recent weeks, to the north of the current test. The 54 Stevenson was drilled into salt at 8,685 ft.

Phillips Petroleum Co. succeeded in capping the 1 Lobit, wild well in the League City field of Galveston County. The well had been wild for some days and was making an estimated 20,000 bbl. of oil a day when first out of control but was showing about 30 per cent water when killed.

DAILY AVERAGE PRODUCTION FOR WEEK

	Jan. 1 crude oil	Distillate, allied products	Dec. PAW quota all oils	Dec. 25 crude oil
Arkansas	79,605	4,800	81,700	79,180
California	797,400	45,500	873,800	792,750
Colorado	6,975	.....	7,000	6,875
Eastern fields	58,720	9,450	83,350	67,575
Illinois	213,550	12,700	227,700	210,750
Indiana	13,250	.....	14,400	11,850
Kansas	265,750	6,200	291,200	269,900
Kentucky	22,120	3,000	29,000	21,025
Louisiana	356,555	32,000	375,700	353,530
North Louisiana	78,055	.....	.....	78,030
Louisiana Gulf	278,500	.....	.....	275,500
Michigan	44,200	200	56,200	50,800
Mississippi	46,870	.....	48,000	47,420
Montana	21,295	300	23,800	23,140
Nebraska	1,600	.....	1,300	1,600
New Mexico	112,400	6,000	116,600	112,550
Oklahoma	327,150	28,000	356,000	329,100
Texas	1,894,750	126,000	2,018,000	1,894,700
East Texas	364,450	.....	.....	364,300
West Texas	354,000	.....	.....	354,400
North Central Texas	142,650	.....	.....	143,300
East Central Texas	127,100	.....	.....	126,950
Texas Panhandle	95,100	.....	.....	94,400
Texas Gulf Coast	711,750	.....	.....	711,600
Southwest Texas	99,700	.....	.....	99,750
Wyoming	86,150	3,400	103,400	91,895
Total United States	4,358,140	277,550	4,707,150	4,364,640

Total production January 1-December 31, 1943 ..... 1,502,227,625 bbl.
Same period last year ..... 1,419,368,555 bbl.

The blowout had occurred while dual-completing this old producer.

TEXAS UPPER GULF COAST WILDCAT COMPLETIONS

Colorado County: Cities Service Oil Co. 1 M. K. Lehrer, in Naham Mixon Sur., 4 mi. NE of West Garwood field, dry at 9,802 ft.

Jefferson County: Glenn H. McCarthy 1 W. C. Tyrell Trust, Sec. 82, W. C. Dunshie (I.&G.N. Blk.) Sur., 4.7 mi. NW of Hamshire, dry at 9,525 ft.

Matagorda County: Atlantic Refg. Co. 1-A Denman Kountze, in W. H. Gainer Sur. 550, 9 mi. W of Markham, dry at 8,680 ft.

N. CENTRAL TEXAS

Scotland Pool Is Extended By Caddo Lime Producer

WICHITA FALLS, Tex.—S. D. Johnson and Hooper-Byrne 1 W. M. Coleman, Lot 4, Block 78, A.T.N.C.L. subdivision, on the southwest side of the Scotland pool, proved a good well, flowing 65 bbl. in 3 hours to rate a daily potential of 520 bbl. This extension topped the Caddo lime at 5,130 ft., drilling to total depth of 5,718 ft. It topped the Mississippi lime with a slight show of oil at 5,696 ft. Casing was perforated at 5,200-19 ft., and after acidizing, the well flowed 110 bbl. in 1¼ hours.

Jack County.—Shell Oil Co., Inc., 1 Pursley, Slaughter Survey, 10 miles northwest of Jacksboro, was finally completed to open a new pool from the Mississippi lime, gaging 35 bbl. of oil and 15 bbl. of water in 24 hours from pay at 5,443-5,634 ft. Rathke Oil 1 Helen Slusher, J. M. Brown Survey, 12 miles southeast of Jacksboro, was drilling in lime below 4,602 ft. This wildcat had a show of oil estimated at 4 bbl. per day in sand at 4,455-62 ft.

NORTH TEXAS WILDCAT COMPLETIONS

Archer County: Akin & Dimick and Bridwell Oil 1 J. Conrady, 200 ft. from N, 1,000 ft. from W, Sec. 101, Blk. 4, Clark & Plumb Sur., dry at 1,218 ft.

M. W. Blair Oil 1 H. O. Prideaux, 150 ft. from E, 550 ft. from S, 100-ac. lease, F. Saunders Sur., dry at 791 ft.

Valley Osage Oil 1 Mrs. J. H. Turbeville, 1,320 ft. from N, 1,120 ft. from E, Sec. 28, Jefferson County School Land, dry at 1,136 ft.

Frank Wood 1 C. L. Abercrombie, 1,200 ft. from N, 550 ft. from W, Blk. 105, M. Hutchinson Sur., dry at 1,406 ft.

T. L. Wheeler 1 Annie Pernatz, 150 ft. from N & E, Sec. 19, Blk. 4, Clark & Plumb subd., dry at 1,162 ft.

Childress County: John A. Murphy 1 S. J. Clark, 330 ft. from N & E, 160-ac. unit, Sec. 6, Blk. 9, H.&G.N. Sur., base Strawn 5,080 ft., Mississippi 6,205 ft., dry at 6,507 ft.

Cooke County: M. P. Springer 1 C. E. Marshall et al, 330 ft. from N, 4,869 ft. from E, 517-ac. tract, Alex. Horton Sur., 2 mi. NW Walnut Bend, Simpson 5,445 ft., Ellenburger 5,760 ft., dry at 5,840 ft.

Jack County: Shell 1 W. T. Pursley,, 330 ft. from N & E 162-ac. tract, N. A. Slaughter Sur., 10 mi. NW Jacksboro, Caddo 4,595 ft., Marble Falls 5,014 ft., Mississippi 5,440 ft., Ellenburger 5,822 ft., shot 100 qt. 5,331-5,631 ft., pumped 35 bbl. plus 15 bbl. water, T.D. 6,011 ft. Discovery.

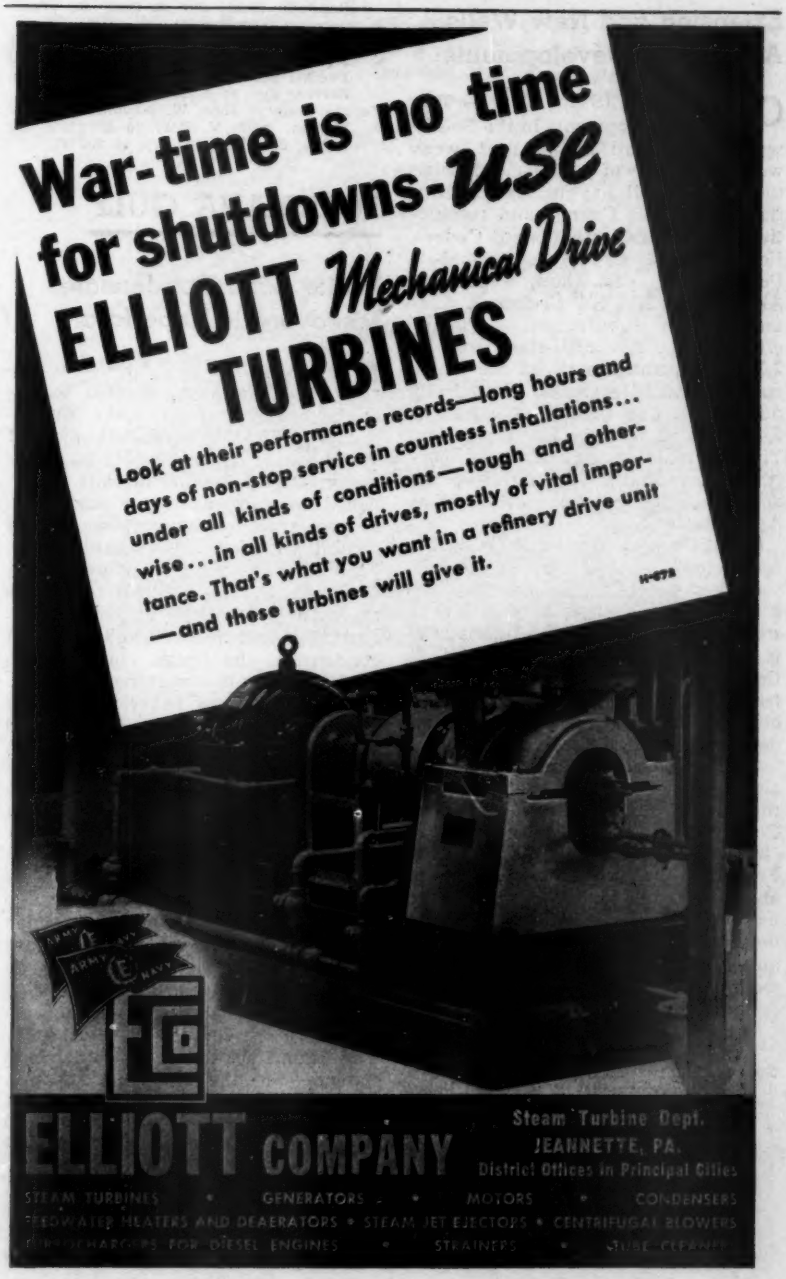
Montague County: Gulf 1 D. A. Haggard, 1,607 ft. from N, 467 ft. from E, Sec. 2,863, 4½ mi. NW of Bowie, Simpson 6,765 ft., S.S.O. 6,810-16 ft., dolomite 6,980 ft., Ellenburger 7,125 ft., dry at 7,255 ft.

WEST CENTRAL TEXAS

ABILENE, Tex.—A new strike from the Ranger lime in Eastland County was indicated at North American Oil Consolidated 1 R. H. Hodges, Frances Blundell Survey, on the east outskirts of the town of Ranger, which drilled 2 ft. of saturated lime from 3,396-98 ft. and cemented casing just above the pay. Additional pay will be drilled after drilling plug, but some observers say the well is capable of making 100 bbl. daily at its present depth.

This new well is in an area drilled during the boom days of Ranger, but the wells were plugged and abandoned many years ago. Early production practices allowed the wells to flow wide open until they were depleted, but it is believed that under present conservation measures new wells in these old areas will prove profitable.

In Shackelford County, spudder was being moved in on Phillips Petroleum Co. 1 Buford, Section 29, Blind Asylum Land, which reached 4,500 ft. in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the Ellenburger and cemented casing at 4,050 ft. Plug will be drilled with the spudder in an effort to complete as a producer in the Marble Falls lime, which was topped at about 4,000 ft. with showings of oil.

WEST CENTRAL TEXAS WILDCAT COMPLETIONS

Haskell County: Hunter & Hunter 1 Mabel Jean Wood, 3,000 ft. from N, 660 ft. from W, 674-ac. tract, L. Dyches Sur., Palo Pinto 3,407 ft., dry at 3,482 ft.

Jones County: Texas Co. 1 B. D. Rogers, 660 ft. from S & W, 541-ac. tract, M. Northington Sur., dry at T.D. 3,385 ft.

SOUTHWEST TEXAS

Extension and New Wells Are Week's Developments

CORPUS CHRISTI, Tex. — Two major developments in the Southwest Texas district the past week were indication of a major extension to the deep oil pay at Agua Dulce field in Nueces County and completion of a new pay producer at Cadena field in Duval County. Simmonds & Perry 2 fee, east flank wildcat at Agua Dulce, NW SW Section 2, Simmonds-Perry subdivision of Puenticitas grant, ran drill-stem test at 7,327-32 ft. and recovered the water cushion and 14½ stands of oil in 20 minutes. It was then cored ahead to 7,403 ft. and will try for completion. This is a major extension to the 7,300-ft. oil pay on the east flank of the dome, which is the deepest sand at Agua Dulce.

Duval County.—Taylor Refining Co. completed the 4 P. G. de Garcia, southwest extension and new pay discovery well at Cadena field, in Blackstone-Hardeman Survey A-288, 2,630 ft. south of the 3 de Garcia well. It flowed 82 bbl. daily through 9/64-in. from perforations at 3,462-67 ft. in a new shallow sand for the area. Total depth is 6,245 ft.

Brooks County.—Standard Oil Co. of Texas will drill a deep test in the old Alta Mesa field of Brooks County. This is the 23 Mestena Oil & Gas Co. Lease 1, projected as a deep Frio-Vicksburg zone test, to go to about 6,500 ft. It is on a 2,555.97-acre lease in La Mestena y Gonzalena Survey, 4,250 ft. from east line of lease and 1,661 ft. south of the old No. 1 well. Rig is being moved to the location.

LOWER GULF COAST WILDCAT COMPLETIONS

Goliad County: Fred W. Shield 1 Etta Terrell, discovery well at Terrell Point, in Antonio Siedeck Sur., 4 mi. SE of Fannin and 350 ft. W of Victoria County line, E of Fannin gas area, T.D. 5,203 ft., P.B. T.D. 4,685 ft., 5½-in. 4,850 ft., perf. 14/4,650-65 ft., top Frio pay sand 4,650 ft., 2-in. tubing set 4,636 ft., completed 12-2-43, P.T. 156 bbl. day 5/32-in. choke, G.O.R. 3,000-1, T.P. 1,300 lb., C.P. 1,700 lb., gravity 23.9, no water.

Refugio County: P. R. Rutherford 1 B. W. Trull, NE Sec. 4, Johnson & Pugh subd., Bonnie View ranch, 6 mi. E of La Rosa field, dry at 6,550 ft.

SOUTH TEXAS WILDCAT COMPLETIONS

Brooks County: La Gloria Corp. 1 Lawrence D. Miller, Lot 66, J. H. Ballard farm lot subd., Los Olmos and Loma Blanca grant, 3 mi. W of Falfurrias, 2½ mi. SW of La Gloria field, dry at 7,338 ft.

Duval County: Taylor Ref. Co. 4 P. G. de Garcia, in Blackstone-Hardeman Sur. A-288, new pay discovery well at Cadena, T.D. 5,245 ft., 7-in. casing 3,525 ft., perf. 21/3,462-72 ft., 2-in. tubing 3,461 ft., completed 12-6-43, P.T. 82 bbl. day on 9/64-in. choke, G.O.R. 597-1, T.P. 575 lb., casing sealed, gravity 34.6, no water.

Jim Hogg County: M. L. Massingill and W. H. Spice 1 Carlos Palacios Est., Blk. 18, D. G. Duce Sur. 287, ¾ mi. east of Randado field, dry at 3,107 ft. (Temporarily abandoned).

Live Oak County: Henderson Coquat 1 M. T. Buckaloo, in Blk. 28, Richard Everett Sur. A-7, 1½ mi. NW of Three Rivers, dry at 6,505 ft.

Zapata County: John W. Mecom 1 Harvey Mecom, in J. V. Borrego grant, 5 mi. NE of San Ignacio, dry at 602 ft.

LOUISIANA GULF

White Lake Condensate Discovery to Reperforate

NEW ORLEANS, La.—Union Oil Co. of California is still testing at the 1-A State-White Lake, discovery well in the northwest part of White Lake, Township 14s-2w, Vermilion Parish, having already established production of gas-condensate at two levels but having experienced trouble with freezing on initial tests. First test was run in perforations at 10,660-75 ft. and second test was made in perforations at 10,618-42 ft. and this last test flowed gas and condensate, no gage, on 5/32-in. choke, 3,200 lb. working pressure. These holes were squeezed off and perforations made higher for the third test. Total depth is 12,000 ft., with 5½-in. set at 10,768 ft. This will probably be classified as a 1943 discovery although final completion has not yet been effected.

Union Sulphur Co. completed the 1-A Dorris Andrus, 50-8s-2e, at Branch in Acadia Parish, through perforations at 9,918-23 ft. to open a new sand for the area. Completions was 14 bbl. of condensate daily on 11/64-in. choke with large volume of gas. It had also shown gas-condensate on tests just below the 10,400-ft. level. The Egan field of Acadia Parish was extended to the northeast by Sun Oil Co. 1 W. L. Trimble, completed through perforations at 10,400-10,500 ft. in second sidetracked hole, total depth 10,550 ft. No gage of the flow has been reported but it cleaned with tubing pressure of 3,250 lb., making gas and condensate and was shut in.

Sohio Oil Co. failed to find commercial shows in the 2 Lutcher-Moore Lumber Co., second test in the Fields area of Beauregard, 4-7s-12w, and abandoned the hole with total depth of 8,107 ft. about 100 ft. below top of the discovery sand. The discovery well, the same company's 1 Lutcher-Moore, was completed as a gas-condensate well in perforations at 8,011-20 ft. in the Bancroft Cockfield sand.

LOUISIANA GULF COAST WILDCAT COMPLETION

Acadia Parish: Union Sulphur Co. 1-A Dorris Andrus, Sec. 50-8s-2e, new sand discovery at Branch field, Acadia Parish, T.D. 10,536 ft. in sidetracked hole, 7-in. set at 9,936 ft., 5½-in. liner on bottom, perforated at 9,918-23 ft., completed 12-8-43, flowing 14 bbl. of 49.5-gravity condensate daily on 11/64-in. choke, with large volume ((ungaged) of gas, T.P. 3,250 lb., casing sealed, no water.

EASTERN TEXAS

Smith County Wildcat May Be Carried to 11,000 Ft.

DALLAS, Tex. — Skelly Oil Co. 1 Chisum, T. Hawkins Survey, near Sand Flat, Smith County, which already has assured production from about 7,000 ft., may be carried to 11,000 ft. to test the Travis Peak, which it topped at 9,947 ft., according to electric log. It is now bottomed at a total depth of 10,000 ft., contract depth. Cores in the Pettit lime showed oil at 9,233 ft., and it is believed that the wildcat is located high enough structurally to produce from the Travis Peak. Sohio Production Co. and Pure Oil Co. 1 Della S. Wright, Jose Marcia Garcia Survey, 7 miles northeast of Lindale, was drilling below 7,400 ft. in shale. The Paluxy sand, encountered at about 7,125 ft., showed water. Phillips Petroleum Co. 1 Mayfield Co., W. C. Cook Survey, southeast outpost to Chapel Hill, which has indicated good producing possibilities from the Rodessa pay, was planning to retreat with 5,000 gal. of acid when it swabbed dry after casing had been perforated at 8,400-16 ft. Phillips 1 W. J. McMinn, Mary Long Survey, was drilling below 7,560 ft., logging dry Paluxy sand at 7,435 ft. This wildcat is contracted to 10,000 ft. to test the Travis Peak.

No letup in wildcatting was in prospect for the East Texas district. Three new wildcat locations were announced, all relatively shallow projects. In Henderson County, E. B. Germany 1 A. C. Bentley was staked in the Nathaniel Addison Survey, 1½ miles northwest of Trinidad, and will test Woodbine sand possibilities. In Trinity County, American Liberty Oil 1 McClain, a 5,500-ft. test, was staked in the S. H. McClain Survey, northeast of Centralia. Fohs Oil Co. et al 1 W. E. Black, in the L. Norvell Sur-

vey, 1 mile southeast of Tehuacana is a new Limestone County wildcat.

Wood County.—Moncrief & Hyde et al 1 R. L. Simmons, Helena Nelson Survey, near Golden, was expected to reach its Paluxy sand objective within the next few days, after it logged the top of the Buda just below the Woodbine, at 6,045 ft. It was drilling below 6,400 ft. in lime and shale. Top of the Georgetown was called 6,050 ft. Shell Oil Co., Inc., 1 Whatley, a deep test on the southeast flank of the Manziel pool, was trying to repair a leak in surface pipe. It had reached 8,805 ft. after showing 180 ft. of oil on drill-stem test at 8,758-68 ft.

ROCKY MOUNTAIN

Midway District Wildcat Finds Sunburst Dry

DENVER, Colo.—The search for the oil pool in the Midway district, Pondera County, Montana, the presence of which has been indicated in two small producers drilled by R. C. Tarrant and Hagoman & Pond, was narrowed down somewhat by a failure in Hagoman & Pond 3 Rispin, SE SW NW 20-28n-1w, a disappointment in the Sunburst at 1,800-26 ft. It is a west offset to the same firm's 1 Rispin which was completed last August for 74 bbl. of 44-gravity oil first 24 hours on the pump. This well, in turn, is a mile to the northeast of Tarrant 1 DeStaffany, the discovery a year ago, which made 5 bbl. a day on the pump, the oil being of the same high grade. Tarrant drilled a dry hole 2 miles to the southwest of the discovery, and the Texas Co. had a failure 8 miles to the northeast. Somewhere within the limits of these wells the operators hope to find the indicated field. Tarrant is drilling 1 Roth 6 miles to the southeast and also has a deep test to the Devonian under way 1½ miles to the south. Last named, 1 Wood, NE NW 32-28-1w, is the first in the central Sweetgrass arch area to explore the Devonian and lower horizons. It had only a show in the Sunburst at 1,690-1,720 ft., and is now drilling at 3,640 ft., 670 ft. below the top of the Devonian, and had a show of oil and gas at 3,540-45 ft.

Garland test at critical stage.—General Petroleum Corp. 1 Howell, Lot 63-56n-97w, a test on the south flank of the Garland structure, Big Horn Basin, Wyoming, is at a critical depth and at 4,070 ft. is feeling for the Embar, the first objective. It topped the red beds at 3,505 ft., and is estimated to be running 150 to 200 ft. lower than a well 3½ miles to the northwest drilled several years ago by the Kinney-Coastal Oil Co., a small oil producer in the Tensleep. All other wells drilled in the field have been higher on structure than this well and have carried gas in the Tensleep. Should the General Petroleum well find oil in that horizon it will prove the existence of an oil ring below the gas. Since more than 2,700 acres have been proven for gas in the Tensleep, the significance of an oil discovery on the flanks becomes apparent.

Pondera wildcat in Devonian.—A. B. Cobb & Co. 1 Hirshberg, which is the second well in the central Sweetgrass arch exploring the Devonian, located on the south flank of the Pondera structure as outlined in the upper horizons, reached the top of that formation at 2,935 ft., and is drilling below 3,667 ft. Rotary tools are being used and no tests have been made of shows on the way down. One gas show was encountered around 3,092 ft., and an oil show at 3,105 ft. in black limy shale. It had a sand at 3,552-62 ft. from which some gas came up through the mud, but which gave no indications of being accompanied by water.

MONTANA WILDCAT COMPLETION

Midway, Pondera County: Hagoman & Pond 3 Rispin, SE SW NW 20-28n-1w, T.D. 1,985 ft., Sunburst 1,800-26 ft., some water, ribbon sand 1,960-85 ft., 600 ft. water, P.B. and shot at 1,808-27 ft., no show, plugged and abandoned.

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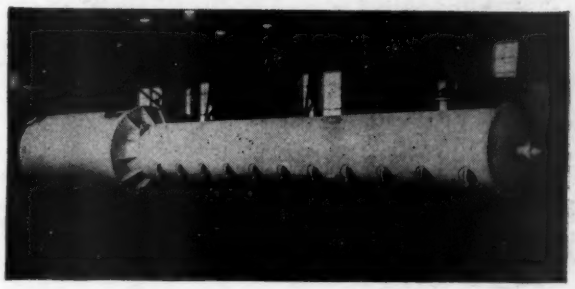

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MICHIGAN

Nine Wells Added to Total In Closing Week of Year

SAGINAW, Mich.—New wells added 2,750 bbl. to the daily potential production of Michigan oil fields in the final week of 1943. Nine producers were completed as against seven dry holes, three of which were wildcat tests. New production potentials ranged from upwards of 1,000 bbl. a day from a Goodwell field completion in Newaygo County, to 12 bbl. from a shallow Van Buren County well. Another Goodwell completion rated 800 bbl. a day after acid treatment.

The state Conservation Department issued six more drilling permits, bringing the 1943 total to 617, compared with 570 in 1942. The new locations proposed include two sites in Bay County. Others are in Mecosta, Newaygo, Allegan and Ottawa. One is for Gulf Refining Co. to drill in Bay County to possibly 8,000 ft. in search of natural gas. In 1941 Gulf completed the deepest well ever drilled in Michigan to 10,447 ft. and got some oil. The new test is intended to reach the Salina formation and drilling is scheduled to start this month.

MICHIGAN WILDCAT COMPLETIONS

Allegan County, Leighton Township: Fisher-McCall Oil & Gas, Inc. 1 Martin Baker, SW SW SE 27-4n-11w, dry at 1,360 ft.

Lake County, Chase Township: Freeman Oil Co. 2 Castlebar, C½ NW SW NW 29-17n-11w, dry in Berea formation at 2,516 ft.

Roscommon County, Lyon Township: Gordon Oil Co. A-1 State-Lyon, C½ S½ NW NE 33-24n-4w, dry at 4,589 ft.

CALIFORNIA

Exploration Upturn Looked To for the Coming Year

LOS ANGELES, Calif. — California prospectors who averaged one new oil or gas field per month during 1943 have begun 1944 in stride and an aggressive exploration and exploitation program is outlined for 1944.

Continental Oil Co. has an excellent chance of completing a wildcat in the Strand area that may open up a new field but this projected test may be several weeks away due to a redrilling job that still has almost 2,000 ft. to go before reaching the original depth. This is the company's 1-H Kern County Land in 18-30s-26e. On the basis of showings in the upper part of a projected deep test, Standard 67-17-E Jacalitos in Fresno County, 17-21s-15e, shows promise due to gas showings and a claystone quite similar to that cored in the Coalinga Nose field where the Eocene is productive. Because the log of Standard's Jacalitos wildcat appears to be correlating with Coalinga Nose wells this wildcat may bear watching. Standard's Polvadero wildcat east of the Coalinga Nose field on the other hand has not shown unusual promise although some showings were recorded a few weeks ago. This wildcat at 10,299 ft. is temporarily held up with mechanical trouble but a wash-over job has a good chance of recovery.

Several other wildcats are under way in areas where a discovery would result in a good find and lead to substantial production. Included in this group are Western Gulf's wildcat in the Rosedale district of Kern County and Seaboard 1 Garrison-Davis near Magunden, also in Kern County. In the Mountain View area, Di Giorgio Fruit Corp., after drilling several structure core holes, has landed a string of 6⅝-in. casing at 6,415 ft. and will perforate for a test. A formation test failed and it is not known what the basis was for the landing of casing.

The field discovered a short time ago by Bandini Petroleum Co. west of the Round Mountain field in Kern County grows smaller and smaller as

(Continued on page 92)

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OKLAHOMA

Small Oil and Gas Discoveries End Old Year

TWO small discoveries, one oil and one gas, were completed to end the old year but a number of wildcats were prospective pool openers. In eastern Oklahoma County, north of the Jones pool, Stanolind Oil & Gas Co. 1 Johnson pumped 38 bbl. of oil a day in Hunton lime at 5,543-47 ft. and in Hughes County, Otha E. Grimes found gas in Gilcrease sand. It is about 3 miles from nearest gas production.

Seminole County.—B. & M. Drilling Co. 1 Mathis, SE SE SW 6-6n-6e, north of the old Grayson pool, was a possible 2-zone producer. The well had an estimated 5,000,000 cu. ft of gas in sand at 2,776 ft. and the Cromwell at 3,102-08 ft. had a good show of oil. Electric log was being run to test both zones. Production at Grayson is in the Hunton and Simpson series at 4,050 ft.

McClain County.—Carter Oil Co. 1 Cottingham, SE SW 4-7n-3w, on the Washington structure, was drilling below 10,625 ft. in sandy dolomite.

Noble County.—Northeast of Atlantic's East Sams 300-bbl. Misener discovery, the same company's 1 Piel, NW SW SW 7-21n-1w, had a possible extension when it showed 5 ft. of stained sand at 5,078 ft. A drill-stem test was being made at the end of the week.

OKLAHOMA WILDCAT COMPLETIONS

Hughes County: O. H. Grimes 1 Haney, NE NE NE 1-8n-10e, 8,500,000 cu. ft. of gas, Gilcrease sand 2,840-56 ft.

Sunray 1 Baxter, NE SW NW 12-8n-9e, dry, T.D. 4,483 ft., Hunton 4,173 ft., Viola, 4,380 ft., Wilcox 4,468 ft.

Okfuskee County: Manahan Oil 1 McMahan, SW SW NW 9-1s-10e, dry, T.D. 2,685 ft., Bartlesville 2,250 ft.

Oklahoma County: Stanolind 1 Johnson, NW SW NE 9-13n-1e, pumped 38 bbl., Hunton 5,543-47 ft., T.D. 5,885 ft.

Pottawatomie County: Deep Rock 1 Forsee, SW SW SE 11-11n-3e, dry, T.D. 5,796 ft., Misener 5,438 ft., Hunton 5,443 ft.

APPALACHIAN FIELDS

Big Lime Yields Better Than Average West Virginia Well

PITTSBURGH, Pa.—The year-end completions included two fair gas wells in West Virginia, one of which was of more than passing interest. Completions in the area totaled 26 for the week of which 5 were dry, 12 gas wells and 9 oil producers with a daily initial of 135 bbl.

WEST VIRGINIA

Tucker County.—On the Blackwater anticline, Dry Fork district, Ohio Oil Co. is moving in rotary to complete the wildcat on the Kaemmerling tract. The hole is cased to 7,777 ft. with two strings of tools in the hole between that and bottom, 7,979 ft.

Wyoming County.—In the Center district, United Producing Co. completed 1,118 W. M. Ritter Lumber Co. at 3,247 ft. after shot with 40 qt. at 3,187 to 3,214½ ft., the well gaged 2,475,000 cu. ft. of gas.

KANSAS

Rooks County Discovery Is 8 Miles From Nearest Pool

CHAMPLIN REFINING CO. 1 Marcotte, wildcat in SE NE SW 15-10-20w, was shut in for storage after swabbing an average of 60 bbl. of oil an hour, with no water, in the Arbuckle topped at 3,753 ft. Location is in the southwestern corner of the county between the Morel and Zurich pools.

Two pool openers completed and a new pay zone in another area were included in the week's developments. In Barton County, Cities Service Oil Co. finished at its 1 Eveleigh. After recovering 2,387 ft. of oil and 200 ft. of water in ½ hour at 3,299 ft., it was put on the pump and made 425 bbl. of oil in 24 hours. Location is west of the Barton arch and some 8 miles from nearest major production. In Stafford County W. N. Bartlett 1 Kisner pumped 20 bbl. of oil in the Arbuckle at 3,707 ft. to extend the Drach pool 1½ miles northwest. In Stafford County, the new pay was Skelly Oil Co. 1 Arthur, SW NE NW 34-24-15w, which flowed 158 bbl. in Misener sand at 4,262-78 ft. after drilling to the Arbuckle at 4,493 ft.

KANSAS WILDCAT COMPLETIONS

Barton County: Citjes Service 1 Eveleigh, NE SE 11-18-14w, pumped 425 bbl., Sooy sand 3,299-3,311 ft., T.D. 3,332 ft.

Butler County: R. J. Wixson 1 Edmondson, SE SW 32-25-4e, dry, T.D. 2,750 ft.

Barber County: Phillips 1 Davis Ranch Weiner, NW NW NW 3-35-15w, dry, T.D. 5,743 ft., Arbuckle 5,700 ft.

Cowley County: Northern Ordnance 1 Banks, SW NE NE 29-33-6e, dry, T.D. 3,097 ft., Bartlesville 2,890 ft.

Kingman County: Herndon & Danneberg, NW SE 34-8s-9w, dry, T.D. 4,710 ft.

Derby Oil 1 Commanche, SE NW 8-28-8w, dry, T.D. 4,470 ft., Arbuckle 4,440 ft.

McPherson County: Williams & Morine 1 Hutchinson, NE NE SW 14-19-1w, dry, T.D. 2,895 ft.

Rice County: Max Steinbushel 1 Dinsmore, SW SW NE 36-19-9w, dry, T.D. 3,293 ft.

Helmerich & Payne 1 Isern, NW SW SW 1-21-10w, dry, T.D. 3,455 ft., Arbuckle 3,376 ft.

Rush County: N. Appleman 1 Wagner, SW SE SE 12-19-17w, dry, T.D. 3,881 ft.

Stafford County: Phil-Han 1 Taylor, NW NE NW 22-21n-12w, dry, T.D. 3,700 ft.

W. N. Bartlett 1 Kisner, E½ SE NE 3-22-13w, pumped 20 bbl., Arbuckle 3,707-11 ft., T.D. 3,752 ft.

Shell 1 Wolf, W½ NW NW 7-22-11w, dry, T.D. 3,676 ft., Arbuckle 3,646 ft.

LA.-ARK.

Wilcox Sand Shows Oil Northwest of Holly Ridge

SHREVEPORT, La.—There were some prospects of a new oil pool in the Wilcox sand last week at Chicago Mill & Land Co. 1 Mutual test. The well found the Tuscaloosa dry at 8,463 ft. and plugged back to test saturated sand at 3,012-24 ft. Perforations at that depth made 4 bbl. of fluid an hour, about 80 per cent oil. There was no salt water in the fluid. Location is in the NE SE 12-11n-9e, 2 miles northwest of the Holly Ridge Tuscaloosa pool.

NORTH LOUISIANA WILDCAT COMPLETION

Ouachita County: Westgate-Greenland 2 Lewis-Werner, NW SE SW 9-17n-2e, dry, T.D. 6,508 ft.

ARKANSAS WILDCAT COMPLETION

Union County, SE of Hillsboro: Phillips Pet. 1 Gilliam, SE SE 27-18s-13w, dry, T.D. 5,037 ft.

CANADIAN FIELDS

Tests Point to Commercial Well in Athabaska Field

CHATHAM, Ont.—Preliminary tests indicate that Deca 4, LSD 2, 15-66-23w4, in the Athabaska field, north of Edmonton, will be a fair commercial producer of oil and gas, and possibly a flowing well. The well was finished at 1,644 ft., with gas sands at 1,626-31 ft. and oil sand from 1,632-43 ft. The gas flow is estimated at 3,500,000 cu. ft. and oil production at least 25 bbl. a day of heavy black crude with no sand or water. Tubing will be run and the well is expected to flow with a gas lift.

Pinhorn dome.—McColl-Frontenac 6-8-1-8, LSD 6, 8-1-8w4, close to the Alberta-Montana boundary, is deepening after testing a gas flow at 2,970-95 ft. Tests showed 5,000,000 cu. ft. a day with 1,300-lb. bottom-hole pressure.

Vermilion.—With its original 50-well drilling program more than half completed since operations were started last May 30, Cannar Oils deferred further drilling till next spring. Some 27 wells have been drilled, of which 15 are on production, 4 ready to produce, 6 standing cemented and 2 dry. Three locations remain to be drilled. The Vermilion area was the most active in Alberta in 1943, with 35 wells drilled against 25 in Turner Valley.

Turner Valley.—Okalta Oils is expanding its program to drill out untested locations. In 6-19-2w5, Okalta 15, LSD 10, finished at 8,218 ft. with

(Continued on page 92)

Wildcat Completions and Discoveries

DISCOVERIES completed last week were below par, in quality if not in number. The largest potential made was in Barton County, Kansas, at Cities Service Oil Co. 1 Eveleigh. The well pumped 425 bbl. of oil a day in sand at 3,299 ft. The location is about 3 miles southeast of small production in the Arbuckle lime.

The balance of completions were small, with the exception of the discovery well at Terrell Point, Goliad County, in the Texas Lower Gulf Coast. The well, Fred W. Shield's 1 Etta Terrell, located 4 miles southeast of Fannin, and east of the Fannin gas pool, flowed 156 bbl. of 24-gravity oil through 5/32-in. choke in the Frio sand at 4,650 ft. Nearest oil production is about 6 miles east in Victoria County.

WILDCAT COMPLETIONS

	Week ended January 1, 1944					Cumulative total for 1943				
	Oil	Distillate	Gas	Dry	Total	Oil	Distillate	Gas	Dry	Total
Ohio	0	0	0	1	1	4	0	25	59	88
Indiana	0	0	0	2	2	5	0	0	55	60
Kentucky	0	0	0	0	0	22	0	2	115	140
Illinois	0	0	0	3	3	79	0	3	408	409
Michigan	0	0	0	3	3	11	0	3	180	194
Kansas	3	0	0	8	11	59	0	1	374	434
Nebraska-Missouri-Iowa	0	0	0	0	0	0	0	0	26	26
Oklahoma	1	0	1	3	5	43	1	20	256	319
Texas:										
North Central	1	0	0	10	11	62	0	1	374	437
West	0	0	0	3	3	14	0	1	94	109
Panhandle	0	0	0	0	0	0	0	0	6	6
East	0	0	0	0	0	5	1	2	105	113
Gulf Coast	1	0	0	4	5	10	8	8	145	171
Southwest	1	0	0	4	5	27	11	7	275	320
Total	3	0	0	21	24	118	20	19	999	1,156
Louisiana:										
North	0	0	0	1	1	6	0	4	72	82
Gulf Coast	0	1	0	0	1	15	10	1	31	57
Total	0	1	0	1	2	21	10	5	103	139
Arkansas	0	0	0	1	1	3	0	0	64	67
Mississippi and Southeast	0	0	0	2	2	6	0	0	74	79
Montana	0	0	0	1	1	6	0	4	27	38
Wyoming	0	0	0	0	0	8	0	1	15	24
Colorado, Utah	0	0	0	0	0	0	0	1	8	9
New Mexico	0	0	0	0	0	6	0	2	29	37
California	0	0	0	2	2	8	0	10	143	161
Total United States	7	1	1	48	57	399	31	96	2,935	3,461
Total previous week	8	0	2	62	72					

ILLINOIS

McClosky Well May Join Two Areas in White County

MATTOON, Ill.—A possible connecting link between the Phillipstown and New Harmony pools of White County was brought in last week. Burr Lambert and C. E. Brehm 1 Boultinghouse, SW NW NW 19-4s-14w, 2½ miles east of Crossville, swabbed 140 bbl. of oil in 10 hours. Potential tests were to be made after an acid treatment. Pay zone is the McClosky at 3,097 to 3,106 ft., total depth.

Edwards County.—Up in the northwestern part of the county, 4 miles east of Mount Erie and 6 miles west of West Salem, Tide Water Associated Oil Co. 1 Schoick, NW NE NW 18-1n-10e, was setting pipe to test saturation found in the Aux Vases sand at 3,123-29 ft., and 3,143-57 ft.

The holidays and bad weather have cut drilling work in Illinois and Indiana, with most companies reporting that only 50 per cent of their crews are working, due to the zero weather.

ILLINOIS WILDCAT COMPLETIONS

Gallatin County: E. P. Jarvis & Marwell 1 Davis, NE NE SW 1-8s-8e, dry, T.D. 2,973 ft., Waltersburg 2,036 ft., Tar Springs 2,116 ft., McClosky 2,937 ft.

Sangan County: O. A. Reed 1 C. Ross, SE SE SW 21-15n-3w, dry, T.D. 2,277 ft., Trenton 2,217 ft.

Whit County: Heath-Allison 1 Harrell, SE NE SW 33-6s-8e, dry, T.D. 3,185 ft., Tar Springs 2,411 ft., Benoist 2,887 ft., McClosky 3,084 ft.

OHIO, KENTUCKY

Discovery Offset May Be Larger Well

ZANESVILLE, Ohio.—The Preston Oil drilled in its second oil well northeast of its No. 1, in the new pool in the east end of the New Straitsville field. The well, on the Sunday Creek Coal Co. in Section 31, Monroe Township, Perry County, is filling with oil and showing for a better well than the first which made 90 bbl. It will be shot before completed. Two or more additional wells will be started in the pool.

The north extension of the Sandyville field had a good completion on the Welch tract in Section 5, Pike Township, Stark County, by the Natural Gas Co. of West Virginia. Sixty-one feet of sand was found and with

(Continued on page 92)

CRUDE-OIL PRICES

Representative selected crude prices from all sections of the country appear below:

East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.80
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas*	1.00

*No change since 5-21-41.

Gravity Schedules

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Texas*
18-18.9	$0.80	...	...	...
19-19.9	.84	...	$1.06	$0.70
20-20.9	.88	$0.86	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	...	1.07	1.30	.94
32-32.9	...	1.09	1.32	.96
33-33.9	...	1.11	1.34	.98
34-34.9	...	1.13	1.36	1.00
35-35.9	...	1.15	1.38	1.02
36-36.9	...	1.17	1.40	1.04
37-37.9	...	1.19	1.42	1.06
38-38.9	...	1.21	1.44	1.08
39-39.9	...	1.23	1.46	1.10
40 and above	...	1.25	1.48	1.12

*Includes Lea County, New Mexico.

Market Developments

East Coast

NEW YORK.—Steps to improve the unsatisfactory condition of kerosene in District 1 were taken last week. PAW authorized refiners in that district to increase kerosene yield at the expense of distillate fuel oil, inventories of which are now in the best position of any major product on the eastern seaboard.

Increasing kerosene yields at the expense of distillate fuel oil is justified by their relative inventory positions. Stocks of kerosene are approximately 50 per cent of normal while those of light fuel oils are up to 80 per cent. While kerosene stocks have not changed during the past 2½ months, stocks of heating oil have increased almost 60 per cent.

The gasoline situation in District 1 has improved substantially in the same period, stocks increasing more than 25 per cent, but it is not yet "easy." Current inventories are less than 45 per cent of normal and with the weakening of the distribution system, they are not regarded as satisfactory. District 1 quotas for the first quarter of 1944 envision a demand for 341,000 bbl. per day.

Mid-Continent

THE usual end-of-the-year lag was absent this time. "Sold up for January" was a common report among refiners. So pressing were the demands of buyers that not even working stocks of most products were left. "If tank cars are delayed in getting back to us, we accumulate the output of a few days," said one refiner, "but as soon as the cars arrive we go to the tank bottoms again."

Refiners and marketers reported that, making an exception of light lubricating oils, the appeals for petroleum products were so urgent that it would be difficult to name any one of them as topping the others in point of scarcity, though kerosene and light burning oils probably would stand at the head, with gasoline and heavy fuels coming next.

Railroads and war industries apparently were taking heavy fuel oil as fast as it could be produced.

Pacific Coast

LOS ANGELES, Calif. — Warnings were repeated this week in California that Pacific Coast motor-fuel stocks have fallen to what is considered a minimum working position and that strict observance of consumption regulations will be necessary to avoid a cut in ration-coupon values in the near future.

The growing shortage of gasoline in this territory became more evident to motorists this week as many service stations exhausted their quotas which have been established on a pro rata basis by primary suppliers. The situation is rapidly deteriorating to conditions existing in the earlier stages of the war on the East Coast when consumers were unable to "cash in" their rationing coupons.

There were no transactions of any consequence in the refinery spot market. There is little fuel or gas oil available in stocks of independent refiners. Those with distillate fuel oil products in storage are holding it for cracking stock, pending completion of aviation-gasoline facilities at their own plants or those of contemporary manufacturers.

A.P.I. Refinery Report

Week ended December 25, 1943

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Residual	Stocks: Gas oil
Appalachian	144	2,876	339	965
Ind., Ill., Ky.	741	14,544	2,780	6,145
Okla., Kan., Mo.	328	7,019	947	1,978
Censored area*	2,111	33,803	16,324	23,220
Rockies	108	1,393	690	385
California	753	14,389	36,516	11,098
Total 12-25-43	4,185	74,024	57,596	43,791
Total 12-18-43	4,146	72,725	58,272	44,117
Total 12-26-42	3,508	77,781	72,943	45,414

*Reports combined on East Coast, Texas Gulf Coast, Louisiana-Arkansas and Inland Texas at request of PAW.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
December 25, 1943	241,310,000
December 18, 1943	241,795,000
December 26, 1942	233,227,000

*Excludes unrefinable in California.

Gulf Coast

HOUSTON, Tex. — Continued increases in the off-shore movement of crude oil and refinery products are reported in the Gulf Coast market although details on current volume of marine shipments are veiled by military secrecy orders. Much of the current increase in tanker loadings consists of products earmarked for the war zones and consequently bear practically no relation to domestic markets, except as it diminishes the supply available for civilian accounts.

Calls from eastern buyers continued strong this week for greater shipment of kerosene and No. 1 fuel oil. Coastal refiners made adjustments in their processing routine to take full advantage of the modified kerosene and distillate fuel-oil specifications instituted in the eastern states by PAW.

Several refiners diverted part of their motor gasoline and light fuel-oil production to storage where supplies for the WEP 20-in. products line are being accumulated preparatory to starting runs to the East Coast within a few weeks.

REFINERY PRICE SUMMARY

(Prices as of January 4, 1944)

Quotations are f.o.b. plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils, and do not include marine lighterage charges.

REFINERY GASOLINE

Octane (A.S.T.M.):	80†	72-74	68-70	63-66
Mid-Continent*	†6.00-6.25	5.750-6.000	.....	5.625
Gulf Coast	6.00-6.50	§5.750-6.250	§5.750-6.250	§5.250-5.750
Northeast Coast	9.80	9.2	9.2	.....
California	.....	6.255-6.500	5.750-6.125	5.125-5.500

*Basis Group 3. †1939 C.F.R. (research method). ‡Inland Texas and adjoining counties in Arkansas and North Louisiana. §Unleaded.

KEROSENE AND DISTILLATE FUEL OIL

Product—	Kerosene†	No. 2	No. 3	No. 5	No. 6‡
Mid-Continent*	4.125-4.375	3.500-3.625	3.375-3.500	$0.85	$0.80-1.27
North Louisiana*	4.125-4.375	3.500-3.625	.....	.....	0.80-1.27
Pennsylvania	6.000-6.125	5.875-6.125	5.875-6.000	.....	.....
California	4.500-5.500	5.500	5.500	§1.10-1.25	§1.10-1.15
Northeast Coast	6.800	6.700	6.700	1.95	1.65
Gulf Coast	4.125	3.750-3.875	.....	1.35	0.85

*Reflecting OPA ceilings, depending on destination of shipments. †Quotations for 41-43 gravity. ‡Range depends on gravity. §Pacific Specification 300. ¶Pecific Specification 400.

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	4.750	5.700
North Texas	4.375	5.250
North Louisiana	4.375	5.250
California	4.875	5.500

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Drilling Contractors

Wheless Drilling Co., Shreveport, La., cemented 5½-in. casing at 7,303 ft., and was perforating opposite a section of the Pettit lime from 7,130-76 ft. in its 1 Walker, John Walling Survey, Rusk County, Texas, a wildcat.

Gilger Drilling Co., Houston, Tex., has been awarded the contract on Grubb & Hawkins 4 J. S. Watkins, in 4-6s-5e, Port Barre field, St. Landry Parish, Louisiana. This proposed 6,500-ft. test is the first activity in the Port Barre field in several weeks.

Sam Dorsman, Longview, Tex., has contract to drill a Woodbine sand test in Henderson County, Texas, 1½ mile north of Trinidad. It is known as E. B. Germany 1 Bentley, and is located along the north line of the Nathaniel Addison Survey.

Ryan Drilling Co. has the contract on Gulf Oil Corp. 1 Wasson-Quinn et al, at Stowell field in Chambers County, Texas. Surface casing was landed at 1,440 ft., and the test was drilling ahead to the 8,000-ft. contract.

Muskegon Development Co. has the drilling contracts on two tests in Bay County, Michigan, for Gulf Refining Co. These are the 1 George C. Knochel, in C S½ NE NW 35-15n-4e, and the 1 Carl, in C N½ SW SW 2-14n-4e.

Steen Drilling Co., Houston, Tex., is the contractor on Gulf Oil Corp. 1 Woods-Ruidenga, on west side of the Stowell field, and in Chambers County, Tex. The test was spudded last week, 10¾-in. and surface pipe set at 1,416 ft.

Roeser & Pendleton, Inc., Fort Worth, Tex., have the contract to drill Westgate-Greeland's new wildcat test in Union Parish, North Louisiana. It is the 1 Frost et al, 660 ft. north and west of southeast corner of 26-22n-1e, scheduled to be drilled to 5,000 ft.

Henshaw Bros., San Antonio, Tex., have the contract to drill Sullivan & Garnett's 1 Florian Moczygemba, wildcat in Wilson County, Texas, in Luis Manchaca Grant A-18, 2½ miles north of Falls City. This is a 5,500-ft. Wilcox test and work is expected to start shortly after first of the year.

Ashby Drilling Co., Grand Haven, Mich., will drill 1 Salina for Gulf Refining Co. in 34-15n-4e, Bay County, Michigan.

Royer-Farris Drilling Co. is the firm style of a drilling-contracting partnership that has been formed in Wichita, Kans., by Horace H. Royer and Leonard A. Farris, both of Wichita. Royer and Farris have purchased a string of rotary tools from Hays of Denver, Colo. Currently they are drilling a wildcat in SW NE NW 25-15-15w, Russell County, Kansas.

Robert W. Atha has the drilling contract on Gulf Refining Co. 1 Swantek-Schultz, in C S½ SE SW 35-15n-4e, Bay County, Michigan.

Union Rotary Corp. will drill Sohio Producing Co. 1 William A. Prosch, in C S½ NE NE 1-18n-10w, Osceola County, Michigan.

R. M. Perry has the contract on Socony-Vacuum Oil Co., Inc., 3 J. F. Varnum, in SE SW SW 24-1s-16w, Van Buren County, Michigan.

Cron & Gracey have been awarded the drilling contract on a 10,000-ft. test to be drilled by Barnsdall Oil Co. It is the 1 R. Kuntz, in the Gibson field area of Terrebone Parish, Louisiana, 330 ft. south and west of the northeast corner of SE¼ 34-17s-5e.

Texon Drilling Co. was moving in rig on the Sullivan & Garnett 7 Austin, in the Agua Dulce field of Nueces County, South Texas.

Leonard Drilling Co. has contracts for two wells for Mogul Oil Co. in Mecosta County, Michigan. These are the 1 Arthur Vincent et al, in C SW SE 8-16n-3w, and the 1 Frank Wilson, in C NE SE 8-16n-7w.

Abbott & Traxler, drilling contractors, brought in a wildcat well January 1 on the Simmons and Perry headquarters ranch 5 miles south and east of Banquette as a producer, opening up a new field in Nueces County, Texas. The well may be the first of

1944 in Texas. The wildcat is located 3,107 ft. south and 520 ft. east of the north and west lines of the Simmons and Perry Subdivision, Puenticitas Survey.

Olson Drilling Co. is operating tools on the wildcat of Gulf Oil Corp. and Sinclair Prairie Oil Co. in Ellis County, Oklahoma. The wildcat is the 1 Polin, in C NE SW 27-24-26w, situated on a block of several thousand acres. The Olson unit being used to drill this test was moved from Northern Ordnance Co.'s failure in Woodward County, which was carried to a point below 10,000 ft.

Crew on New Penn Development Co. and William E. Snee well at time well was completed as dry hole in Oriskany sand at 9,024 ft., near Johnstown, Pa. Harry Ray, foreman for New Penn Development Corp.; Harvey Garrison, driller; Glen Williams, tool dresser; Finnett Ely, tool dresser; J. T. Knight, driller, and J. A. Fox, Foley & Fox, drilling contractors on the well

Texas Joins Other Oil States in Workmen's Compensation Provisions

Effective January 1, payment of premiums on workmen's compensation, public liability and employers' liability in Texas, is based on straight-time wages and not on overtime or doubletime. This means, as an example, that premiums for a 56-hour, 7-day work week, at $1 per hour, would be payable on $56 only, or on the basis used before the Wage and Hour law went into effect. This practice will offer a distinct saving on premiums paid by employers, as compared with the former method of payment.

Other oil-producing states that permit payment of premiums on workmen's compensation and public liability insurance on the above basis are Ohio, Michigan, Illinois, Oklahoma, New Mexico, Kansas, Arkansas, Louisiana, Indiana, Kentucky, Mississippi, Montana, Nebraska, West Virginia and Wyoming.

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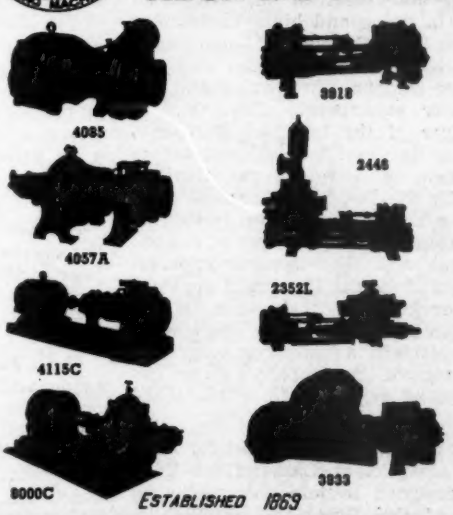

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PERSONALS

Made Vice President In Charge of Gas Operations

F. T. (TOM) PARKS, who has been engaged in oil and gas engineering work from 1910 to the present, principally with the Empire Gas & Fuel Co. and affiliated organizations, was elected vice president in charge of gas operations of the Public Service Co. of Colorado, following its segregation from the Cities Service group and reorganization as an independent company under local control.

Parks was born at Smith Center, Kans., and received his education there in grade and high schools and Kansas State College at Manhattan.

His business career began with the Empire company, first as oil and gas engineer at Arkansas City, then as manager of the local gas company, next at Bartlesville as general superintendent in charge of gas distribution for the Empire companies.

Then he was transferred to Denver to become district manager of gas operations and then general superintendent of the gas division of the Public Service Co. of Colorado, which position he held until he was elected vice president in November and placed in charge of the company's entire gas operations.

Horace C. Davis, geologist for Lone Star Gas Co. at Daingerfield, Tex., has resigned to join the geological staff of the Texas Co. at Wichita, Kans.

P. F. Shannon, who was for several years field manager for Tropical Oil Co. at El Centro, Colombia, has been transferred to the Bogota headquarters of the company. He has been succeeded by **John M. Gates,** who has been connected with Tropical operations for the past 22 years. Shannon at one time was a member of the faculty of Colorado School of Mines.

John G. Norton, chief engineer, Magnolia Pipe Line Co., has returned to Dallas, Tex., to resume his duties after a 6-month leave of absence during which he supervised construction of pump stations on the 24-in. crude oil and 20-in. products lines of War Emergency Pipelines, Inc., in a section extending from the Mississippi River to a point in eastern Ohio.

Warren T. Bostwick, in charge of the Texas Co.'s lease and land department at Wichita Falls, Tex., has been transferred to the Denver, Colo., division. **Ed L. Zihlman,** formerly scout in the Abilene, Tex., district, succeeds Bostwick at Wichita Falls.

Clifford T. Magin, who was technologist in the Wilmington, Calif., refinery of Shell Oil Co., Inc., has been promoted to assistant manager of the laboratory. **Clark H. Wiget** has been promoted from junior engineer in the Wilmington refinery to engineer-research work in the motor laboratory of the Martinez, Calif., plant.

O. H. Stout, superintendent of production for Magnolia Petroleum Co. at Lovington, N. M., has been transferred to Duncan, Okla., to replace **J. C. Shaw,** who retired as superintendent there.

Homer Lynn, scout for Magnolia Petroleum Co., first in Oklahoma and later in Mississippi, has been assigned to the Dallas, Tex., headquarters of the company.

L. C. Burroughs, assistant superintendent of the Houston, Tex., refinery of Shell Oil Co., Inc., who has been confined to a hospital since he was stricken with poliomyelitis several months ago, has improved so much that he was permitted to spend Christmas at his home.

David R. Edwards has been appointed manager of employe relations for Ohio Fuel Gas Co., it is announced by **E. M. Tharp,** general manager of the company. Edwards has spent 18 years with Ohio Fuel, starting in the industrial department. **Thomas E. Darby** has been made general service manager, succeeding Edwards. Darby is an architectural engineer. He joined the company in 1932 as a heating engineer.

J. A. McCutchin, production manager for British American Oil Co., Ltd., in western Canada, and formerly chief petroleum engineer for British-American Oil Producing Co., Ltd., Tulsa, resigned January 1 to become associated with his brother in the drilling and producing business at Dallas, Tex. He was exploitation engineer for Shell Oil Co., Inc., Mid-Continent division, for 5 years before joining British American.

Shifts: **J. F. Francis,** superintendent, Lone Star Gas Co., Gordon to Breckenridge, Tex.; **Edward P. Burtchaell,** engineer, Stanolind Oil & Gas Co., Odessa, Tex., to Hobbs, N. M., **H. W. Baker,** superintendent, Phillips Petroleum Co., Shreveport, La., to Houston, Tex.; **D. B. Ferguson, Jr.,** drilling contractor, Ferguson Drilling Co., Carmi, Ill., to Oklahoma City, Okla.; **R. L. Wales,** engineer, The Texas Co., Olney, Ill., to Ness City, Kans.; **Victor Horner,** engineer, Carter Oil Co., Owensboro, Ky., to Tulsa; **H. A. Brown,** engineer, Mid-West Refineries, Inc., Grand Rapids, Mich., to Cyril, Okla.; **Henry A. Jackson,** engineer, Magnolia Petroleum Co., Bridgeport, Neb., to Carthage, Tex.; **C. M. Boles,** engineer, Phillips Petroleum Co., Bartlesville, Okla., to Smackover, Ark.

C. W. Krause, who was head of the land and exploration department of Ohio Oil Co. in Houston, Tex., has been made manager of the company's new southeastern division, comprising Florida, Mississippi, Georgia, and Alabama. His office is in Tampa, Fla.

Edmond M. Talk, industrial relations supervisor at the Ingleside, Tex., refinery of Humble Oil & Refining Co., has been appointed indus-

trial liaison representative of the District 3 refining subcommittee and the rubber-reserve committee on manpower. He will serve in the San Antonio, Tex., area, which contains nine refineries producing critical war materials and 10 refineries manufacturing essential materials for the war effort. He will continue to hold his present post at Ingleside.

P. E. Allan, general sales manager of the Associated Division, Tide Water Associated Oil Co., San Francisco, Calif., has been elected a vice president of the company. Allan joined Associated Oil Co. in 1915. Serving in various capacities in the lubrication and refined-oil divisions of the general office, he subsequently became district sales manager in San Francisco and domestic sales manager of the Associated Division.

Frank Phillips, chairman of Phillips Petroleum Co., Bartlesville, Okla., who recently offered $400,000 to Boy Scouts, Girl Scouts and other character-building organizations in an area extending from Canada to the Gulf and from the Rockies to the Atlantic seaboard, provided each of his dollars was matched by a similar contribution, has announced that gifts from other sources exceeded his own.

J. B. Payne, tool pusher, and **Neal B. Robins,** district chief clerk, have been transferred from Louisiana by Humble Oil & Refining Co. to the company's new district office at Everglades, Fla., for the Sunniland district. They will be in charge of drilling and production operations under the direction of the Louisiana division office in New Orleans.

Earl Noble, chief geologist of Union Oil Co. of California, who has spent the past several months in South and Central America, returned to his office in Los Angeles for the holiday season.

John Aston, who was a member of the petroleum engineering staff of The Texas Co.'s California division, returned recently after spending 3 years in South America. He will return to his foreign duties after completing his vacation in this country.

C. A. Cash, formerly treating foreman for Shamrock Oil & Gas Co. at its Sunray, Tex., refinery, has been promoted to assistant superintendent of the refining department at the McKee plant. He joined Shamrock in 1934.

Arnold H. Bleyberg, for many years geologist and paleontologist with Fohs Oil Co., Houston, Tex., has been appointed geologist with the military geology unit, U. S. Geological Survey, Washington, D. C.

Dr. E. V. Barnes and **Leo Hendricks,** geologists of University of Texas, have begun surveys of the Ellenburger producing formations in West Texas, in collaboration with U. S. Geological Survey, with a view of finding more oil reserves. Doctor Barnes will study outcroppings of the formation, which surfaces at Llano, Tex. Hendricks will study insoluble residues.

Hewlett A. Russell has resigned as geologist for Standard Oil Co. of Texas to become an independent operator with headquarters in Graham, Tex. Russell has worked in California, Alabama, Mississippi, Gulf Coast, and East Texas areas, but most of his time has been spent in West and North Texas and New Mexico.

L. T. Potter, vice president of Lone Star Gas Co., was elected president of Dallas (Tex.) Petroleum Engineers Club at a recent meeting. Other officers chosen: First vice president in charge of programs, **W. J. Jackson,** Lane-Wells Co.; second vice president in charge of entertainment, **H. C. Laird,** Otis Pressure Control, Inc.; third vice president in charge of membership, **C. G. Unlaub,** C. G. Unlaub Co.; secretary-treasurer, **J. W. Black,** Magnolia Petroleum Co. The club has a membership of 196, an increase of 150 in the past 12 months.

William F. Bates, field engineer in the San Joaquin division, California, for Shell Oil Co., Inc., has been transferred to the coastal division. Other production department changes announced by Shell in California include: **John T. Doyle,** coastal division, from field engineer to exploitation engineer; **Francis H. Taylor,** San Joaquin division, from construction and maintenance foreman to field engineer; **Lewis F. Busey,** San Joaquin division, from head well puller at Bakersfield to production foreman at Oilfields. In the manufacturing department **Lawrence L. Boyle** has been promoted to head laboratory inspector. **Foster W. Curtis,** formerly in the New York office, has been made engineer in the Wilmington, Calif., plant.

George W. Strake, independent oil operator of Houston, Tex., has given to the Boy Scouts a 2,400-acre park near Conroe, Tex., to be known as Camp Strake. The donor's rise to wealth began with his well which opened the Conroe field.

ARE YOU TOO BUSY TO HANDLE A JOB FOR US?

A good friend and client called us a few days ago and asked this question, knowing that our personnel and facilities, as well as available steel material have been largely devoted to war equipment and war plant construction.

THE ANSWER IS "NO"

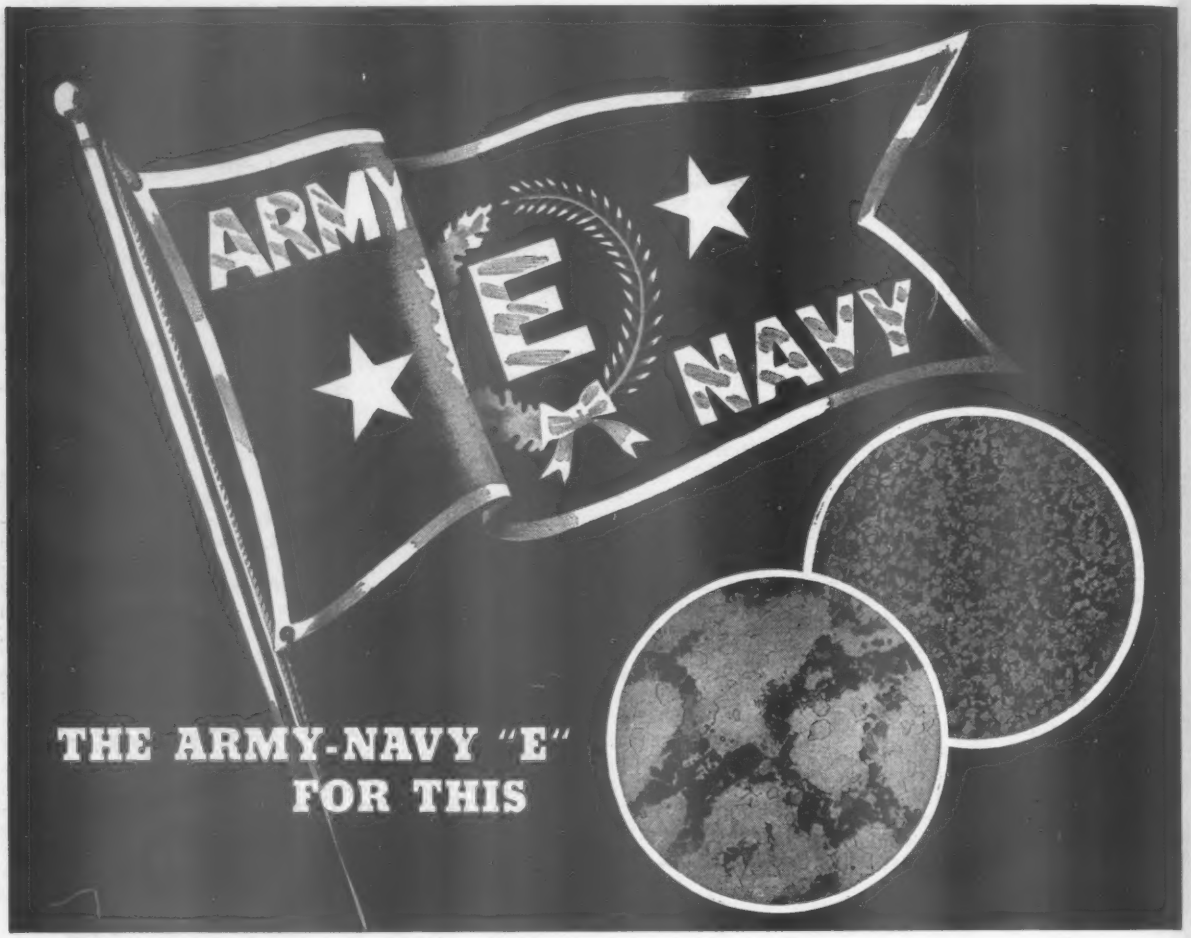
We are indebted to our friend for his inquiry. Most of our wartime construction requirements have been completed and we are now in position to handle the normal oil industry work upon which our business has been built. We will welcome the opportunity to figure with you on the design, fabrication and construction of oil field, refinery, warehouse, pipeline and machine shop buildings, and the manufacture of oil field equipment, such as skids, frames, welding sleeves, derricks, pumping units, etc.

Designs and Estimates Furnished Without Obligation.

Since 1920

PATTERSON STEEL COMPANY

TULSA, OKLAHOMA



On September 5th, 1942, our Mine and Mill at Climax, our Research Laboratory at Detroit and our Conversion Plant at Langeloth, Pennsylvania, were given the Army-Navy Production Award. Since then the award has been twice renewed. The two-starred flag we fly represents a full year of contribution to the war effort recognized by the Army and Navy.

Winning the award by the laboratory began in 1931. It was then that it was founded to meet our needs for authoritative information about molybdenum—containing ferrous materials.

Pearl Harbor intensified our work with producers of war equipment—work that is aided considerably by the accumulated data and experience gained in over ten years of concentrated research.

We are particularly proud to be among those companies whose laboratories are entitled to fly the Army-Navy "E".

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Molybdenum Company

500 Fifth Avenue • New York City

MOLY

Equipment Progress

New Valve-in-Head Engine by Le Roi

Le Roi Co., 1706 South Sixty-eighth Street, Milwaukee 14, Wis., has announced a new four-cylinder, valve-

in-head engine in its Model D140. Other Le Roi power units range from 2 to 12 cylinders, and 4 to 400 hp.

The new engine has a piston displacement of 140 cu. in. and develops up to 33 hp. at 2,400 r.p.m. The valve-in-head arrangement and wet cylinder sleeves are two of the more important features. A drop-forged, counterweighted crankshaft, extra-large main bearings, vertical magneto, drop-forged connecting rods, precision bearings, oil-bath air cleaner, valve-seat inserts, full-pressure lubrication, and conveniently located controls combine with other Le Roi features to produce an engine that can be utilized for a great variety of applications.

Trackson Co. Wins Army-Navy "E"

The employes of the Trackson Co., Milwaukee, Wis., were presented with the Army-Navy E Award for their outstanding effort in the production of ordnance materiel and tractor equipment for the armed forces. The brief but colorful ceremony was held at the main plant.

National Tube Makes Tulsa A District Office

Conversion of the Tulsa sales office of National Tube Co. into an independent district office has been announced in Pittsburgh by National Tube Co., a subsidiary of United States Steel Corp.

Earle E. Smith, of Tulsa, has been appointed district sales manager. Prior to conversion, the Tulsa sales office had operated under the Dallas, Tex., district.

E. H. Pelster and B. F. Collyer will serve as assistants to Smith. Office will remain at 1904 Philtower Building.

Tube Turns Opens West Coast Offices

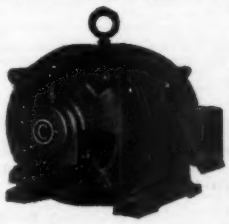
Opening of two new West Coast offices for Tube Turns, of Louisville, Ky., has been announced.

T. H. Pike, Jr., district manager for the Pacific Coast area, may now be reached at 2611-12 Russ Building, San Francisco, Calif.

Since October 15 a second office has been maintained in Room 422-A, Smith Tower Building, Seattle 4, Wash. In this office John M. Hartley, formerly of the Los Angeles office, will handle matters pertaining to Washington, Oregon, and British Columbia. The Los Angeles office was closed October 15.

New General-Purpose Protected Motor

General-purpose, open-rated motors in a new protected design are available in sizes from 1½ to 15 hp., from



Century Electric Co., 1806 Pine St., St. Louis, Mo., in their Form J. The upper half of the end bracket is closed to minimize the possibility of dripping liquids or falling solids entering the vital parts of the motor.

Two powerful fans located behind the bearing brackets draw cooling air through the bearing bracket openings, around the bearings, across the windings and to the air passages between the outer surfaces of the magnetic core and the frame — the heated air being expelled through openings at the side and bottom of the frame. A new bulletin 6-1 describes these motors in detail.

Vaughn Joins National Supply Co. at Houston

Herman H. Vaughn, who for the past 6 years has been associated with Frick-Reid Supply Corp., Tulsa, as assistant credit manager, has resigned, effective January 1, and has gone to Houston, Tex., to become identified with National Supply Co., in the treasury and credit department. Prior to his connection with Frick-Reid, Vaughn was connected with the Fourth National Bank, Tulsa, for 10 years, last three as assistant cashier.

McCarty Opens New Office In Pittsburgh, Pa.

Establishment of new offices in Pittsburgh, Pa., open January 3, is announced by the McCarty Co., industrial advertising counsellors. This expansion is in keeping with the company's conviction that great postwar activity will center around Pittsburgh.

R. S. Reed, Jr., for the past 12 years advertising director of Pittsburgh Equitable Meter Co. of Pittsburgh, and Merco Nordstrom Valve Co. of Pittsburgh and Oakland, has been appointed manager of the Pittsburgh office. The McCarty company has handled the advertising of the Nordstrom concern for 22 years through its Los Angeles and San Francisco offices.

Effective January 3 the Pittsburgh Equitable Meter account will also be serviced by the company's Pittsburgh office, which is located in Suite 2205, Koppers Building.

Republic Opens Store in Jackson, Miss.

Republic Supply Co. announces the opening of a supply store at 221 South West Street, Jackson, Miss., with V. W. Mitchell in charge.

Joys Joins General American Transportation

Carl C. Joys, Jr., whose business career has long been an association with the oil industry and the steel industry where it affects oil interests, has joined General American Transportation Corp. to activate the Plate and Welding Division.

Previously associated with A. O. Smith Corp., Joys will have offices at General American's plant at Sharon, Pa., and in New York also. His headquarters will be at 135 South La Salle Street, Chicago.

Ohio Fields

(Continued from page 84)

a volume of 1,750,000 cu. ft. of gas and a rock pressure of 1,300 lb.

OHIO WILDCAT COMPLETION

Muskingum County, Falls Township: Wittmer 1 Anna T. Lewis, Lot 17, Clinton, 3,522 ft., dry, T.D. 3,619 ft.

INDIANA

EVANSVILLE, Ind. — A 2-mile south extension to the New Harmony pool was indicated last week at Sells Petroleum et al 1 Herman Wade, SE SW NE 14-5s-14w, in Posey County. Operators were to drill plug and test the Hardinsburg sand at 2,446-65 ft. at the end of last week.

INDIANA WILDCAT COMPLETIONS

Gibson County: Superior 1-B Hull, NW NW NE 26-1s-11w, dry, T.D. 2,211 ft., McClosky 2,095 ft.

Knox County: Gulf Ref. Co. 1 Anna Halter, SW NE NE 13-2n-11w, dry, T.D. 1,951 ft., McClosky 1,845-50 ft.

EASTERN KENTUCKY

ASHLAND, Ky. — The new year finds drilling activities in eastern Kentucky maintained at a steady pace with no apparent reduction in operations in the immediate offing.

Bed Rock Petroleum Co. completed Well 44 on the P. E. Caudill tract in Magoffin County at a total depth of 1,080 ft. with a daily production of 3 bbl. of oil. In the Little Paint Creek area of the same county, No. 52, a key well, on the L. C. Baily land, is drilling at 678 ft.

Canadian Fields

(Continued from page 83)

Madison limestone at 7,737 ft. is testing, and Okalta 18, LSD 7, and 21, LSD 15, have been spotted. In 18-19-2w5, Okalta 14, LSD 11, is below 7,135 ft. with Madison at 7,060 ft; while new location has been made for Okalta 19 in LSD 14. In 24-19-3w5, Okalta 17 has been spotted in LSD 9, 20 in 13, 22 in 15, and 23 in 11. In 35-19-3w5, Okalta 16 has location in LSD 15; while in 36-19-3w5, Okalta 13 is drilling in LSD 12.

Nova Scotia.—Potential oil areas to be tested next spring are in Inverness, Cumberland and Hants counties. Oil indications in Inverness were reported about 3 years ago by Dr. T. B. McAllister of Boston, following which a survey was made for McAllister and associates by Dr. W. L. Whitehead of Harvard, and some seismographic work was done last summer.

California Fields

(Continued from page 82)

each new well is started. In Bandini's third well, the Vedder of Miocene age, was barren except for a very thin oil sand and there is a possibility the hole may be whipstocked. The fault against which this accumulation was trapped was encountered at 2,410-30 ft. General Petroleum's second well in this field does not look much better than Bandini's present well as the swab has only brought up mud, water and a small amount of oil. Universal Consolidated found the Eocene barren in 1 Surfluh, in 13-15s-17e, in the West Raisin City field in Fresno County, and plans are under way to land casing and test out the Miocene which contained about 10 ft. of good-looking oil sand. Only one well has been finished in the Miocene to date in this field.

WILDCAT COMPLETIONS

Los Banos district, Merced County: Shell 75-11 Alberti, 11-10s-11e, dry, T.D. 4,305 ft., Kreyenhagen 3,629 ft., Domengine 4,022 ft., no tests made.

Norwalk district, Los Angeles County: General Petroleum 1 Allen, 12-3s-12w, dry, T.D. 10,370 ft., 40° to 60° dips in lower 4,000 ft. of hole, bottomed in massive brown shale in lower Pliocene, no showings found, no tests of any interval made.

Classified Advertising

UNDISPLAYED RATE

6 CENTS A WORD, minimum charge $2 per insertion.

SITUATIONS WANTED, 4 cents a word, minimum charge $1.

BOX NUMBERS, count 9 words when replies are to be sent to our Tulsa Office.

10% DISCOUNT if 3 insertions are ordered at one time, with check accompanying order.

All classified advertising payable in advance.

DISPLAYED—PER INCH

Classified display advertising set in single or double column style:

1 inch	1 time	$7.00
1 inch	13 times	6.50
1 inch	26 times	6.00
1 inch	39 times	5.50
1 inch	52 times	5.00

Rates are governed by total space used within 12 months from date of first insertion. Credits are allowed when lower rates are earned.

FORMS CLOSE 9:00 A.M. MONDAY
Published Each Thursday

WANTED

WRECKERS & EXCAVATORS, INC.
BUILDINGS, BRIDGES, PLANTS AND STRUCTURES WRECKED
We are also interested in purchasing plants for liquidation.
Inquiries invited.
100 Fifth Avenue — New York 11, N. Y.

PETROLEUM TAX SERVICE

PETROLEUM INDUSTRY TAX AND COURT SERVICE

Devoted to the needs and interests of the petroleum industry. Monthly. Subscription price, $10 per year. Sample copy sent on request. Leo C. Haynes, Editor; P.O. Box 1024, Austin 6, Tex.

WANTED

OIL structure, Government data covering same. Want to drill two wells, attractive proposition open. Address P.O. Box 1373. Great Falls, Montana.

WANTED: Distributors for Oklahoma and Mississippi to handle a general line of drilling muds. Drilling Mud Corp., 315 Thompson Bldg., Tulsa, Oklahoma.

WANTED to contact party interested in oil leases, with some geological ability to look over oil and gas seepages in B. C. Canada. Putting over a lease on large structure. R. M. Thomason, Deaver, Wyoming.

WANTED: Party to drill 2 Clinton sand wells, Reading Township, Perry County, Ohio, on 200 and 100-acre leases. Gas territory will bear investigation. Box B-961, The Oil and Gas Journal, Tulsa, Okla.

WANTED TO BUY FOR CASH: Oil and gas production—will purchase wells to salvage. Rogers & Wright, phone 30-171, 715 Peoples Bldg., Charleston, W. Va.

ROYALTIES

FOR SALE

Gas Royalty. ⅛ royalty under 5,000 acres. 30 producing wells. 1 drilling. 4,000 acres adjoining. Income over $10,000.00 per year. 3 veins of coal. Can be bought at a bargain. Information furnished on request.

Write to

Rogers & Wright
715 Peoples Bldg.,
Charleston, West Virginia

PATENT ATTORNEYS

PATENTS, Trade-Marks, Booklet, "General Information Concerning Inventions and Patents" and "Free Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 418, Bowen Bldg., Washington, D. C.

FINANCING

CAPITAL SEEKERS — Interested in raising $25,000 or more for a legitimate project should write to AMSTER LEONARD, Fox Theater Bldg., Detroit 1, Mich.

Classified Advertising

RANCHES AND FARM LANDS

COLORADO RANCHES

84,000-acre Valley Land and Stock proposition, well located and low taxes. Carrying potential oil possibilities, reported favorable for oil drilling. Some mineral rights reserved. Interested buyer invited to write for details.

PERCY E. A. CONVERSE
Property Marketers
Pawnee Rock, Kansas

FOR SALE—Irrigated farm, 160 acres. Will accept all oil payments or cash. Farm, 320 acres, irrigated, little cash, balance oil payments. Located best part of Pecos Valley. Plenty of water. Immediate possession. Write W. H. Woodman, Box 21, Roswell, N. M.

SITUATIONS WANTED

OIL ACCOUNTANT, knowledge of Federal and State taxes, draft deferred. Box B-954, The Oil and Gas Journal, Tulsa, Okla.

EXECUTIVE with thirty years' experience in the oil business part of this time with major company and as vice-president of major independent company also as independent oil producer desires connection with independent company or with parties with money to invest in the oil business as there are many opportunities in the southwest to make money. Box B-262, The Oil and Gas Journal. Tulsa, Okla.

GRADUATE REGISTERED PETROLEUM ENGINEER, 36, 3A, fifteen years experience in drilling and production with independents and majors, available immediately to operator needing practical or technical assistant. Details furnished upon request without obligation. Box B-953, The Oil and Gas Journal, Tulsa, Okla.

GEOPHYSICIST, 29, married, no children (draft classification 2-B), seven years geophysical experience (largely seismic) Mid-Continent and Gulf Coast, employed at present. Desires change to position with greater responsibilities. Major or progressive independent preferred. Box B-952, The Oil and Gas Journal, Tulsa, Okla.

TECHNICALLY trained man, age 45, experience in construction, operation and maintenance of power plants, gasoline plants and refineries. Last 15 years in responsible positions in the oil industry. Now employed as superintendent in small refinery. Desire suitable position with independent oil company. Best of references. Box B-971, The Oil and Gas Journal, Tulsa, Oklahoma.

SECRETARY - STENOGRAPHER, experienced in executive, land, and geological departments. Box B-974, The Oil and Gas Journal, Tulsa, Okla.

CHEMIST, B.S., age 26, draft-deferred, interested in research, development and/or production. Research experience in petroleum and organic intermediates; operation experience in synthetic rubber. Versatile, aggressive, practical. Good chemical engineering background. Permanent position desired with major oil concern. Box B-973, The Oil and Gas Journal, Tulsa, Okla.

MIDDLE AGE man wants position as farm boss, or pump and look after production. Reference exchange. Box B-976, The Oil and Gas Journal, Tulsa, Okla.

GEOLOGIST, 18 years experience drilling wildcats and field wells in southwest Texas; now chief Geologist, Independent Oil Company; would consider similar position with operator who would allow personal Royalty and Lease trades. Draft Classification 2-AH. Box B-975, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING and Production Supt., or Tool Pusher, 27 years experience, would like connections with small growing company, would take part interest and living salary. Can furnish best of references. Owned own tools and production 15 years. Age 44. Can go anywhere. Box B-961, The Oil and Gas Journal, Tulsa, Okla.

HELP WANTED

EXPERIENCED REFINERY DRAFTSMAN, refinery located in Tulsa. State qualifications, draft status and salary desired. Box B-956, The Oil and Gas Journal, Tulsa Okla.

CIVIL AND MECHANICAL ENGINEERS, Pipe Line Experience, Headquarters, Tulsa. PIPE LINE PUMP STATION ENGINEERS, expert with Diesel type engines, for work in Oklahoma. 48-hour week. Major pipe line company. State qualifications, draft status, and salary desired. Box B-957. The Oil and Gas Journal, Tulsa, Okla.

• • • • WANTED • • • •

Major oil company with continent-wide operations and research seeks graduate technical men of the following qualifications:

MECHANICAL ENGINEERS—with petroleum refinery or similar experience. Should be familiar with refinery design, estimating, construction, mechanical equipment, engineering materials, and utilities systems. Process knowledge desired although not essential.

CHEMISTS AND CHEMICAL ENGINEERS interested in research, design, or plant operation. Should have training and experience in refinery or other industrial organizations.

Work not of a temporary nature. In reply state experience, education, age, marital status, draft classification and salary expected, include small snapshot (not returnable). Replies strictly confidential. Applicants now employed at highest skill in war industries not solicited. Box B-670, The Oil and Gas Journal, Tulsa, Okla.

• • • WANTED • • •

Experienced Grease Man

A major oil company with nation-wide operations seeks man who has experience and thorough knowledge in the development and manufacture of greases for Industrial, Marine and Automotive applications.

In replying state experience, education, age, marital status, draft classification and salary expected; also include small snapshot (not returnable). Replies strictly confidential. If employed in essential war work, availability certificate required. If already working at your highest skill, do not apply. Box B-970 211 So. Cheyenne, Tulsa, Okla.

NOTICE TO ADVERTISERS

Advertisers offering positions to workers skilled in critical war industries are requested by the War Manpower Commission to include the following sentence in their advertisement:

"Applications from those now employed in war industries will not be considered."

HELP WANTED

OIL-TRADE publication has excellent opportunity for writer with practical engineering experience or training in refinery construction or operation. Previous writing experience not required. Box B-964, The Oil and Gas Journal, Tulsa, Okla.

CHEMICAL plant in Detroit area wants experienced or recently graduated mechanical and chemical engineers. Also men who expect degrees in near futture. Important defense work. Write giving references, education, experience and salary desired. Must quality under WMC regulations. Box B-861, The Oil and Gas Journal, Tulsa, Okla.

• • • WANTED • • •

MECHANICAL OR CHEMICAL ENGINEERS

Major oil company with nation-wide operations seeks *Mechanical or Chemical Engineers*, preferably college graduates, with experience in lubricating oils and their application to industry. Sales experience in this field will be helpful but not essential.

Such men can expect:

1. **A good future in work covering lubrication problems in industrial plants now primarily working on war equipment.**
2. **To participate in a training course presented by the employer.**
3. **To receive a good starting salary.**
4. **To have employment which will not be of a temporary nature.**

In reply state experience, education, age, marital status, draft classification and salary expected and include small snapshot (not returnable). Replies strictly confidential. If employed in essential war work, availability certificate required. If already working at your highest skill, do not apply. Box W 211 So. Cheyenne, Tulsa, Okla.

CHEMICAL Mud Engineer for Kansas. Drilling Mud Corp., Tulsa, Okla., Phone 3-5616.

LARGE MANUFACTURER of widely diversified machinery lines wants an engineer with experience in petroleum industry, to coordinate and promote selling activities between factory and field organization. Moderate amount traveling necessary. Excellent opportunity for energetic young man desiring permanent position. Box B-972, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED PETROLEUM ENGINEER—Between 28-45 for development and research work on rubber products for use in petroleum industry. Permanent essential job with midwestern rubber company with outstanding record of consistent growth and progressive planning. International business. Now developing post-war expansion program. State experience, education, salary requirements, etc. All inquiries acknowledged. Box B-978, The Oil and Gas Journal, Tulsa, Okla.

POSITION OPEN

Experienced 3-C Anti-Knock Octane Testing Operator wanted, or capable motor-method operator interested in learning newest anti-knock methods. Also some other lab positions open. Splendid opportunity get into essential war work. Box B-980, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE—MAPS

FOR SALE—MAPS

685 oil fields in South Texas and Louisiana now mapped and maintained daily; show all intimate details of ownership and development. 2 ft. square. Price $3.50 for each field. Also County and Base Maps.

ZINGERY MAP CO. Houston, Tex.

Journalisms:

THROWING light on a subject" is always an aid to understanding; more recently it has become an important tool of the refiner in "understanding" the progress and control of operations. This comes from throwing various kinds of light on the product stream to find out how the reaction is going, and what efficiency is being obtained. These methods have sped up the control of processes and have greatly increased efficiency of operation by reducing the time lag between taking of samples and reporting of analytical results thereon, on which changes in operating conditions must be based. X-ray diffraction, electron diffraction, mass and emission spectrography, ultraviolet spectroscopy, Raman and infrared spectography are $5 words, but the application of those principles and methods has revolutionized analytical control of processing.

Dr. C. H. Schlesman

Dr. F. P. Hochgesang

In next week's issue, Dr. Carlton H. Schlesman, director, research and development division, general laboratories, and Dr. E. P. Hochgesang, research chemist, of Socony-Vacuum Oil Co., Inc., collaborate in presenting an article on "Radiation, the New Petroleum Analytical Tool." Dr. Schlesman has served 6 years in his present position. He received his professional training at Lehigh and Johns Hopkins. In the latter institution he received his doctorate, and studied particularly the application of physical chemistry to osmotic pressure, X-rays, infrared radiation, etc., under the famous Dr. E. E. Reed.

NEXT week, E. A. Braker will discuss methods of making use of the most economical size prime mover, and promoting smooth operation of mechanical pumping rigs, by bringing the peak and the average power requirements in the pumping cycle as near together as possible. The discussion will appear in two installments. The series on "Oil-Well Pumping Practices," by J. Zaba, will be interrupted for a couple of weeks, while Braker's article is appearing.

THE Journal doesn't know whether to feel flattered or embarrassed. Recently OPA sought, and was granted, permission to copy two of its recent stories on operating conditions in the Rocky Mountains.

CALENDAR

January

SOCIETY OF AUTOMOTIVE ENGINEERS, annual meeting and engineering display, Book-Cadillac Hotel, Detroit, Mich., January 10-14.

KANSAS OIL MEN'S ASSOCIATION, annual meeting, Broadview Hotel, Wichita, Kans., January 24-25.

February

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, annual meeting, Waldorf-Astoria, New York, February 20-24.

AMERICAN SOCIETY FOR TESTING MATERIALS, spring meeting and committee week, Netherland Plaza Hotel, Cincinnati, Ohio, February 28 to March 3.

March

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, SOCIETY OF EXPLORATION GEOPHYSICISTS, AND SOCIETY OF ECONOMIC PALEONTOLOGISTS AND MINERALOGISTS, annual meetings, Dallas, Tex., March 21-23.

April

NATIONAL ASSOCIATION OF CORROSION ENGINEERS, annual meeting, Rice Hotel, Houston, Tex., April 10, 11 and 12.

June

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